



**NATIONAL
CONSERVATION
LANDS**

Grand Staircase-Escalante National Monument

DRAFT RESOURCE MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT

VOLUME 1: DEAR READER LETTER, ABSTRACT, TABLE OF CONTENTS,
CHAPTERS 1–4

August 2023



U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

Our Mission

The Bureau of Land Management's mission is to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations.

NATIONAL CONSERVATION LANDS

Mission

Conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations.

Photo by VISIO Photography (James and Jenny Tarpley),
2015 and 2016 GSENM Artists in Residence,
Grand Staircase-Escalante National Monument



United States Department of the Interior



BUREAU OF LAND MANAGEMENT
Paria River District
Grand Staircase-Escalante National Monument
669 S. Highway 89A
Salt Lake City, UT 84101-1434

August 11, 2023

In Reply Refer To:
1610/6240 (UT-P01)

Dear Reader:

Enclosed is the Grand Staircase-Escalante National Monument (GSENM) Draft Resource Management Plan (RMP) and associated Draft Environmental Impact Statement (EIS). The Bureau of Land Management (BLM), Paria River District Office prepared the Draft RMP/EIS in response to Presidential Proclamation 10286, which restored the boundaries and management conditions of GSENM to how they existed prior to December 4, 2017. Proclamation 10286 also directed the BLM to create a new management plan for all federal lands within the restored boundaries of GSENM. The BLM developed the Draft RMP/EIS pursuant to the BLM's regulation for resource management planning found in 43 Code of Federal Regulations Subpart 1610, the National Environmental Policy Act of 1969, and other applicable laws.

The purpose of the Draft RMP/EIS is to provide a management framework, including goals, objectives, and management direction, to guide GSENM management consistent with the protection and/or restoration of Monument objects and the management direction provided in Proclamation 10286. The approved RMP would replace the existing resource management plans for the GSENM and Kanab-Escalante Planning Area that were approved in February 2020.

The BLM encourages the public to provide information and comments pertaining to the analysis presented in the Draft RMP/EIS. We are interested in any new information that would help the BLM as it develops the Proposed RMP/Final EIS. As a member of the public, your timely comments on the Draft RMP/EIS will help formulate the Proposed RMP/ Final EIS. The BLM will accept comments on the Draft RMP/EIS for ninety (90) calendar days following the Environmental Protection Agency's publication of a Notice of Availability of the Draft RMP/EIS in the *Federal Register*. Additionally, a concurrent 90-day comment period for proposed recreational target shooting closures and a 90-day comment period for proposed areas of critical environmental concern (ACEC) is initiated with the publication of the NOA. The BLM must receive comments by November 9, 2023.

The BLM can best use your comments and resource information submissions if received within the review period.

Electronic comments may only be submitted via the ePlanning website:

<https://eplanning.blm.gov/eplanning-ui/project/2020343/510>. You also may hand deliver hard copy comments to the BLM Paria River District Office during business hours Monday-Friday (8:00 a.m. to 4:30 p.m.) or mail them to: ATTN: GSENM RMP Project Manager, BLM Paria River District, 669 South Highway 89A, Kanab, UT 84741. To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format via the ePlanning website.

Your review and comments on the content of this document are critical to the success of this planning effort. If you wish to submit comments on the Draft RMP/EIS, proposed ACECs, or proposed recreational target shooting closures, we request that you make your comments as specific as possible. Comments will be more helpful if they include suggested changes, sources, or methodologies, and reference to a section or page number. The BLM will consider and include comments containing only opinion or preferences as part of the decision-making process, although they will not receive a formal response from the BLM.


Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

The BLM will hold a total of five public meetings. Two meetings will be held virtually, and three meetings will be conducted in-person, one each in Kanab, Panguitch, and Escalante. Details of all meetings will be announced once they are known. The dates and locations of Draft RMP/EIS public engagement meetings will be announced at least 15 days in advance.

The BLM will make available for public inspection a hard copy of the Draft RMP/EIS at the BLM Paria River District Office, located at 669 South Highway 89A, Kanab, Utah 84741.

Sincerely,

**HARRY
BARBER**

 Digitally signed by HARRY
BARBER
Date: 2023.08.02 14:33:29
-06'00'

Harry A. Barber
District Manager

Grand Staircase Escalante National Monument Draft Resource Management Plan and Environmental Impact Statement (GSENM RMP/EIS)

1. Responsible Agency: United States Department of the Interior
Bureau of Land Management
2. Type of Action: Administrative (X) Legislative ()
3. Document Status: Draft (X) Final ()
4. Abstract: The Grand Staircase-Escalante National Monument (GSENM) Draft Resource Management Plan (RMP) and associated Draft Environmental Impact Statement (EIS) describe and analyze alternatives for the planning and management of public lands and resources administered by the Bureau of Land Management (BLM), Paria River District Office. The planning area is located in Kane and Garfield counties in Utah. Within the planning area, the BLM administers approximately 1,865,600 acres of surface land, referred to as the decision area. The decision area does not include state, municipal, or private land.

Proclamation 10286, which restored the boundaries and management conditions of GSENM, directs the BLM to “prepare and maintain a new management plan for the entire monument” for the specific purposes of “protecting and restoring the objects identified [in Proclamation 10286] and in Proclamation 6920.” The RMP’s underlying purpose (40 CFR 1502.13) is to provide a management framework, including goals, objectives, and management direction, to guide GSENM management consistent with the protection and/or restoration of GSENM objects and the management direction provided in Proclamations 10286 and 6920.

The GSENM RMP must reflect the unique issues, management concerns, and resource conditions of the management area while reflecting the purposes set forth in Proclamation 10286. As part of the RMP revision process, the BLM conducted scoping to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed in the Draft RMP/EIS. Planning issues identified for this RMP revision focus on climate change, ecosystem resiliency, wildland fire and fuels management, promoting recovery of special status species, wilderness management, livestock grazing, land tenure patterns and access strategy, broad recreation uses and response to increasing population and changing land uses.

Alternative A is the No Action Alternative that continues current management from the 2020 Approved RMPs for the GSENM and Kanab-Escalante Planning Area. Under this alternative, the BLM would continue to manage the use of public lands and resources under the existing RMPs, as amended, to the extent they are consistent with Proclamation 10286. In some cases, decisions in the 2020 Approved RMPs are inconsistent with Proclamation 10286; in those instances, Alternative A has been modified to be consistent with Proclamation 10286. **Alternative B** emphasizes flexibility in planning-level direction to maximize the potential for an array of discretionary actions that may be compatible with the protection of GSENM objects. **Alternative C** underlines the protection and maintenance of intact and resilient landscapes using an area management approach to selectively allow for discretionary uses in appropriate settings. Four management areas similar to those used in the 2000 Monument Management Plan would be established: the front country area, passage area, outback area, and primitive area. **Alternative D** strives to maximize natural ecological processes by minimizing active management and limiting discretionary uses. Land use allocations would curtail discretionary

uses, including recreation, livestock grazing, rights-of-way, and activities under special recreation permits.

Alternatives B, C, and D provide a range of management strategies for addressing issues identified through internal assessment and public scoping. Comments submitted by other government agencies, public organizations, state and tribal entities, and interested individuals were given careful consideration.

Review period: The review period on the GSENM Draft RMP/EIS is 90 calendar days. The review period began when the Environmental Protection Agency published a Notice of Availability in the *Federal Register*.

5. For further information, contact the following:

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Executive Summary

ES.1 INTRODUCTION

The Grand Staircase-Escalante National Monument (GSENM) Draft Resource Management Plan (RMP) and Draft Environmental Impact Statement (EIS) describes and analyzes a range of alternatives for managing public lands within GSENM planning area. The planning area is in Kane and Garfield Counties in Utah. Within the planning area, the United States (U.S.) Department of the Interior, Bureau of Land Management (BLM) administers approximately 1,865,600 acres of surface land, referred to as the decision area. The decision area does not include state, municipal, or private land.

On October 8, 2021, Presidential Proclamation 10286 restored the boundaries and management conditions of GSENM to those that were in place prior to Presidential Proclamation 9682, which reduced the size of GSENM and divided it into three units. The purpose of Proclamation 10286 is to “ensure that the exceptional and inimitable landscape of GSENM, filled with an unparalleled diversity of resources, will be properly protected and will continue to provide the living laboratory that has produced so many dramatic discoveries in the first quarter century of its existence.”

ES.2 PURPOSE OF AND NEED FOR ACTION

Proclamation 10286 directs the BLM to “prepare and maintain a new management plan for the entire monument” for the specific purposes of “protecting and restoring the objects identified [in Proclamation 10286] and in Proclamation 6920.”

The RMP’s underlying purpose (40 Code of Federal Regulations [CFR] 1502.13) is to provide a management framework, including goals, objectives, and management direction, to guide GSENM management consistent with the protection and/or restoration of GSENM objects.

The following purposes are set forward in Proclamations 10286 and 6920, or they have been identified based on key present and historical GSENM management challenges.

- **Protect and/or restore the entirety of GSENM’s large, remote, rugged, and markedly impenetrable landscapes.** GSENM includes extraordinary dark night skies, natural soundscapes, and a rich mosaic of objects of natural, historical, and scientific interest. Utah’s large extent of unspoiled natural, roadless areas is unique in the lower 48 states, and protection of these lands led to Proclamation 6920.

The primary purpose of the plan is to protect and/or restore GSENM as a whole, for its value as a unique, unspoiled, and natural landscape and its use as an outdoor science laboratory. GSENM’s immense scale and unspoiled naturalness serve as a foundation for the rest of GSENM’s objects, including but not limited to the diversity of ecotypes; geological, cultural, and paleontological resources; vegetation; and wildlife.

Management will address anthropogenic—or human-caused—impacts and challenges. Increases in anthropogenic factors pose diverse challenges for resource preservation (for example, adverse vegetation and soil impacts, loss of geologic and cultural resources, the loss of the potential for human solitude,

adverse effects on certain wildlife species, and increases in noise). Incremental and gradual degradation of resources over time, due to ongoing uses, can easily occur unnoticed.

- **Emphasize GSENM as a living, outdoor laboratory.** GSENM focuses on science and provides for diverse and significant research and discovery related to varied resources and objects. Proclamation 6920, which originally designated GSENM in 1996, states, “[e]ven today, this unspoiled natural area remains a frontier, a quality that greatly enhances the monument’s value for scientific study.” Science is the foundational purpose of GSENM.

Through scientifically informed management, GSENM will sustainably provide for scientific pursuits. Given the intensification of human-caused changes in the world, undisturbed and unaltered natural landscapes on the geographic scale of GSENM are increasingly essential, rare, and hard to maintain. Accordingly, GSENM is equally important both for scientific understanding of the past and for understanding changes and trends that allow us to appropriately plan for and understand the future.

- **Protect and/or restore GSENM’s biological resources.** GSENM supports a range of ecotypes, as well as reference populations, across the landscape’s substantial range of elevation and large geographic extent. Due to the remoteness and substantial variation in elevation and topography, GSENM contains five life zones, a variety of habitats, multiple ecoregions, unique and isolated plant communities, and a diversity of invertebrates, birds, reptiles, and mammals.

The BLM will manage species within interconnected communities and ecosystems. Climate change and drought are pushing ecological conditions outside the historical range of variability, affecting the function and resilience of vegetation and, in turn, habitats and species. Accordingly, ecotypes, vegetation communities, and habitats will be managed for resilience.

- **Protect GSENM’s cultural resources.** GSENM provides for scientific, tribal, and public uses of cultural resources. Cultural resources are locations of human activity, occupation, or use that contain materials, structures, or landscapes that were used, built, or modified by people. Cultural resources include archaeological sites, buildings, structures, objects, districts, and locations associated with cultural practices or beliefs of contemporary communities, including Tribal Nations.

Discretionary uses, including livestock grazing and rising visitation levels, pose challenges for archaeological, and historic resource protection, and for tribal access and uses (for example, Tribal Nations with ties to GSENM have appropriate access to traditionally sacred places and landscapes). Management will provide for varied access and uses, while protecting cultural and historic resources.

- **Protect GSENM’s geology, paleontology, and scenic landscapes.** GSENM landscapes contain unique geological resources, world-class paleontological resources, and extraordinary scenery. Scenic exploration can be accessed via paved and unpaved roads that serve as arteries through GSENM.

Geological and paleontological resources will be protected; they also will be appropriately available for scientific use and public enjoyment. Scientific uses require access and resource protection.

- **Protect and/or restore opportunities to experience GSENM's remote landscape and associated adventure and self-discovery.** While not identified as an object in need of protection, Proclamation 10286 acknowledges world-class recreational opportunities in GSENM. Most visitation to GSENM is recreational, and high and increasing levels of recreational visitation are a top management challenge. Large numbers of visitors can both degrade the visitor experience and impede protection of GSENM objects, including ecologically sensitive areas and species.

The BLM will sustainably protect and/or restore GSENM's objects and remote, fragile landscape amid rapidly rising visitation levels. The BLM also will provide diverse recreational opportunities and basic facilities.

- **Manage discretionary uses in GSENM in the context of protecting, maintaining, or restoring GSENM objects.** GSENM lands have long served a variety of uses and purposes for Tribal Nations, European settlers, and the descendants of both. Since the designation of GSENM in 1996, there has been controversy regarding the BLM's discretionary uses within the context of GSENM preservation mandates.

Discretionary uses will be compatible with sustainable protection and/or restoration of GSENM's objects.

ES.3 PLANNING ISSUES

Relevant issues discussed in this EIS are as follows:

- How would proposed management actions and land use allocations contribute to air pollutant emissions and affect air quality and visibility?
- What would be the expected contribution to greenhouse gas (GHG) emissions from proposed management?
- How would proposed management affect long-term carbon storage and sequestration in GSENM?
- How would proposed management affect biological soil crusts?
- How would proposed management affect vulnerable soils?
- How would proposed management affect soil health and ecological function?
- How would existing and proposed land use allocations and discretionary uses affect terrestrial vegetation, including special status plant species?
- How would vegetation management and restoration approaches affect landscape-scale ecological functioning, terrestrial vegetation, and special status plant species?
- How would management decisions of activities that disturb soils and accelerate erosion affect water resources (groundwater, surface water, wetlands, riparian areas, floodplains, and water quality)?
- How would proposed management impact water quality (and water quality standards set by the State of Utah and the U.S. Environmental Protection Agency) and protection of dependent resources? How would proposed vegetation management and land use allocations affect noxious and invasive, nonnative plants?

- How would proposed management impact historic properties?
- How would proposed management protect cultural resources, including cultural landscapes, traditional uses, and historic properties?
- How would proposed management ensure continued traditional uses of religious or cultural sites important to Tribal Nations and local communities?
- How would proposed management impact landscapes of religious or cultural importance to Tribal Nations and local communities?
- How would proposed management decisions regarding paleontological resource management (such as curation, protection, survey, collection, outreach, and interpretation) impact paleontological resources, research communities, local communities, and visitor experiences?
- How would land use allocations and discretionary uses impact paleontological resources?
- How would land use allocations and discretionary uses impact unique geological features?
- How would proposed management affect wildlife, fisheries, and special status species resources?
- How would proposed management affect inventoried visual values, including scenic quality and the public's highly valued experience of enjoying scenery?
- How would proposed management actions affect dark night skies?
- How would proposed management affect natural quiet soundscapes?
- How would land use allocations and discretionary uses affect fire and fuels?
- How would vegetation management actions affect fire and fuels?
- How would proposed management affect the size, apparent naturalness; outstanding opportunities for solitude or primitive, unconfined recreation; and supplemental values of lands with wilderness characteristics?
- How would vegetation management decisions affect woodland and forestry product harvest in the planning area?
- How would proposed management impact livestock grazing and ranching operations under existing permits and leases?
- How would proposed management affect rangeland condition?
- How would proposed management affect the BLM's ability to provide recreational opportunities and infrastructure while protecting GSENM objects of historical and scientific interest?
- How would proposed management affect the travel and transportation system in GSENM?
- How would proposed management affect land use authorizations and land tenure in the decision area?
- How would management affect the relevant and important values of potential areas of critical environmental concern (ACECs)?
- How would management affect the nature and purpose of the Old Spanish National Historic Trail?
- How would management impact the viewshed surrounding scenic routes and the experience of enjoying scenic routes within the planning area?
- How would management impact the cultural, historic, and natural resources for which National Heritage Areas were designated?

- How would management affect the free-flowing condition, water quality, outstandingly remarkable values (ORVs), and tentative classification of river segments found suitable for inclusion in the National Wild and Scenic Rivers System?
- How would management affect the wilderness characteristics of wilderness study areas (WSAs)?
- How would BLM management actions impact local and regional economic interests and conditions?
- How would BLM management actions impact social conditions and values of communities?
- How would BLM management actions impact the environment, health, and livelihoods of communities with environmental justice concerns?

ES.4 ALTERNATIVES

ES.4.1 Alternative A

Alternative A represents current management from the 2020 GSENM Approved RMPs, which apply to the lands in GSENM as they existed under Proclamation 9682, and the 2020 Kanab-Escalante Planning Area (KEPA) Approved RMP, which applies to the lands that were excluded from GSENM under Proclamation 9682, to the extent that those management actions are consistent with Proclamation 10286. In some cases, decisions in the 2020 Approved RMPs are inconsistent with Proclamation 10286; in those instances, Alternative A has been modified to comply with Proclamation 10286.

Alternative A generally allows for maximum discretionary uses (for example, rights-of-way [ROWs] and livestock grazing) and emphasizes management flexibility while still providing for resource protection as required by applicable regulations, laws, policies, plans, and guidance, including the proper care and management of GSENM objects. Alternative A includes the following:

- **Recreation Management Areas (RMAs):** There are five special recreation management areas (SRMAs), two extensive recreation management areas (ERMAs), and seven recreation management zones (RMZs). These RMAs would cover the entirety of GSENM.
- **Off-Highway Vehicle (OHV) Use:** OHV use would be limited to designated routes, except in No Mans Mesa Research Natural Area (RNA) (ACEC), which would be closed to OHV use, and the Little Desert RMZ in the former KEPA, which would be open to cross-country OHV use.
- **Target Shooting:** Target shooting would be prohibited within 0.25 miles of residences, campgrounds, and developed recreational facilities. The distance may be increased depending on area-specific conditions.
- **Recreational Facilities:** The 2020 Approved RMPs do not expressly discuss recreational facilities. However, there are few expressed restrictions outside WSAs on where development could occur.
- **Livestock Grazing:** Nearly all allotments are available for livestock grazing. All suspended animal unit months (AUMs) could be activated over time, pending subsequent analysis and decisions. The 2020 Approved RMPs allow the creation of new nonstructural range improvements where they are not otherwise restricted by another designation. Existing seedings would be restored using a mix of native and nonnative species.
- **ACECs and RNAs (ACECs):** Under this alternative, management of the previously designated No Mans Mesa RNA (ACEC) would continue. No new ACECs would be designated.

- **Vegetation Management:** The BLM could use the full range of vegetation management methods and tools (such as prescribed fire; mechanical, chemical, and biological treatments; and woodland product removal). Treatments would be prioritized in areas where removal of woodland products would improve rangeland health, wildlife habitat, and forage. Nonnative species would be allowed, where necessary, to optimize land health, forage, and productivity in nonstructural range improvements.
- **Other Discretionary Actions:** Besides WSAs, which are exclusion areas, all lands would be either avoidance areas or open for ROWs, permits, and leases, as allowed by Proclamation 10286. The suitability for these land and realty actions would be assessed on a case-by-case basis. Alternative A also would prohibit the casual collection of all paleontological resources, mineral resources, and petrified wood to the extent that prohibition does not constitute a substantial burden on the exercise of religion under the Religious Freedom Restoration Act and other applicable laws.
- **Lands with Wilderness Characteristics:** Lands with wilderness characteristics would not receive any special management to protect size, naturalness, and opportunities for solitude, or primitive and unconfined types of recreation.
- **Transportation and Access:** Maintenance will be performed in accordance with the 2000 GSENM Management Plan until new travel management plans are completed.

ES.4.2 Alternative B

Alternative B emphasizes flexibility in planning-level direction to maximize the potential for an array of discretionary actions that may be compatible with the protection of GSENM objects. Alternative B includes the following:

- **RMA:** Five SRMAs and three RMZs would be established to provide for specific outcomes-based recreational experiences as identified in recreation setting characteristics. Those desired recreation setting characteristics help produce the recreation activity which, in turn, facilitates the outcomes identified in the SRMA objective. Additionally, nine ERMAs would be designated. These RMAs would cover the entirety of GSENM.
- **OHV Use:** WSAs/instant study areas (ISAs), lands with wilderness characteristics identified for protection, and No Mans Mesa RNA (ACEC) would be closed to OHV use. The remainder of GSENM would limit OHV travel to designated routes, with some road density and siting criteria identified. No areas would be open to OHV use.
- **Target Shooting:** Recreational target shooting would be prohibited within 0.25 miles of residences, from, on, or across highways, campgrounds, and developed recreation facilities. RNAs (ACECs) and WSAs/ISAs would be closed to target shooting.
- **Recreational Facilities:** To provide for public health and safety, recreational facilities, such as designated campgrounds and bathrooms, may be developed at some locations. Recreational facilities would be allowed in accordance with RMA prescriptions.
- **Livestock Grazing:** Allotments that are not under permit would be made unavailable for livestock grazing. Allocated AUMs would be the total permitted use of available allotments. Land health assessments would be required within 2 years of the signing of the record of decision (ROD) on allotments within watersheds that have shown a high degree of departure from reference conditions (henceforth, departed watershed). These eight watersheds (see **Figure 3-24, Departed Watersheds, Appendix A**) were identified using data and methods determined by BLM

Utah State Office relating to water, soils, and vegetation resources. Further analysis is discussed in **Appendix B**. Changes in grazing practices would be made according to the results of the land health assessments and determinations. New range improvements could be allowed if they are consistent with the protection of GSENM objects. The BLM would prohibit nonstructural range improvements with a primary purpose of increasing forage for livestock. Maintenance of existing structural range improvements would be allowed if both the structural range improvement and maintenance are consistent with the protection of GSENM objects.

- **ACEC and RNAs (ACECs):** The BLM would designate two ACECs and four RNAs (ACECs). The purpose of these designations would be to protect intact ecosystems where special management—beyond the typical protections provided in GSENM—would be required to protect GSENM objects.
- **Vegetation Management:** Landscape-scale restoration projects would be used to restore functional and resilient vegetation communities. For all vegetation management efforts, potential for lasting resilient restoration would be maximized through the preferential use of native vegetation. Nonnative vegetation may be used in restoration efforts as consistent with project and site-specific consideration and rationale. New discretionary actions would be avoided within 330 feet of riparian areas, unless the action would improve riparian health and result in no adverse impacts on wetlands and riparian areas.
- **Other Discretionary Actions:** Alternative B would accommodate other discretionary actions, such as ROW authorizations. Areas closed to ROW authorizations would include lands with wilderness characteristics, RNAs (ACECs), ACECs, WSAs, the Old Spanish National Historic Trail, and suitable wild segments of wild and scenic rivers. All other lands would be either avoidance areas or open for ROWs, permits, and leases. To ensure discretionary uses are consistent with the protection of GSENM objects, the BLM would evaluate proposed actions on a project-by-project basis.
- **Lands with Wilderness Characteristics:** The BLM would manage some lands with wilderness characteristics to protect those characteristics (that is, size, naturalness, and opportunities for solitude or primitive and unconfined recreation). Therefore, the BLM would eliminate or limit compatible uses in these areas; others would be managed for other compatible uses while not protecting wilderness characteristics.
- **Transportation and Access:** Routes could be maintained and improved to meet public health and safety needs and/or to protect GSENM objects.

ES.4.3 Alternative C

Alternative C emphasizes the protection and maintenance of intact and resilient landscapes using an area management approach to selectively allow for discretionary uses in appropriate settings. Four management areas similar to those used in the 2000 GSENM Management Plan would be established: the front country area passage area, outback area, and primitive area. The designation of management areas would serve as the primary tool for allowable uses while also protecting GSENM objects. Area descriptions under Alternative C include the following:

- **Front Country Area** – The front country area is the focal point for visitation and provides day-use and overnight opportunities that are supported by developed infrastructure. Educating visitors about GSENM objects and resources and their historic and scientific importance will be emphasized. The front country area allows for visitor centers and contact stations, primary day

use and interpretation sites, highway waysides, and overlooks, developed trails and trailheads, and developed campgrounds. The facilities in this area could accommodate larger groups.

- **Passage Area** – The passage area is the secondary area for visitation and provides day use and overnight opportunities that are less developed than those found in the front country area. The passage area allows for secondary travel routes that are a mix of paved and unpaved roads, which receive use as throughways, scenic driving routes, and provide access to recreation destinations. It also provides access to outback and primitive day use and overnight opportunities. The passage area is intended to provide basic recreational infrastructure to support a range of recreational activities and allow visitors to learn about GSENM objects and resources. This basic infrastructure includes and could include additional trailheads, day use and picnic sites, small campgrounds and designated camping areas, toilets, interpretive sites, waysides and overlooks.
- **Outback Area** – The outback area provides a self-directed visitor experience while accommodating motorized and mechanized access on designated routes. Facilities will be rare and provided only when essential for resource protection or public safety.
- **Primitive Area** – The primitive area provides an undeveloped, primitive, and self-directed visitor experience without motorized or mechanized recreational access. Facilities will be nonexistent, except for limited signs for resource protection or public safety.

Additional descriptions of Alternative C include the following:

- **RMAs:** Fourteen SRMAs would be designated to provide for specific outcomes-based recreational experiences as identified in recreation setting characteristics. Those desired recreation setting characteristics help produce the recreation activity which, in turn, facilitates the outcomes identified in the SRMA objective. The BLM also would designate eight ERMAs to manage for specific recreational outcomes while ensuring resource protection. These RMAs would not cover all lands within GSENM.
- **OHV Use:** The primitive area and some areas, such as No Mans Mesa, WSAs/ISAs, some lands with wilderness characteristics, would be closed to OHV use; the remainder of GSENM (front country, passage, and outback areas) would limit OHV travel to designated routes. In OHV-limited areas, road density would be minimized. Siting criteria would be identified, especially in important resource areas, to ensure the protection of GSENM objects. No areas would be designated as open to OHV use.
- **Target Shooting:** Recreational target shooting would be prohibited in the front country and primitive areas. In the passage and outback areas, target shooting would be prohibited within 0.25 miles of residences, campgrounds, and developed recreation facilities.
- **Recreational Facilities:** Management areas would identify areas in which recreational facilities could be developed to meet future recreational needs. In general, the front country would allow for facilities to accommodate larger groups, while facilities would be nonexistent in the primitive area.
- **Livestock Grazing:** Allotments that are not under permit would be made unavailable for livestock grazing. Allotments that are both in GSENM and Glen Canyon National Recreation Area (Glen Canyon), and the pastures and allotments fully within Glen Canyon would be closed to livestock grazing. Allocated AUMs would be the total permitted use of available allotments. Land health assessments would be required within 2 years of the RMP/EIS record of decision on allotments within departed watersheds. Changes in grazing practices would be made according to the results of the land health assessments and determinations. No new structural range improvements would

be permitted unless a current (within the last 10 years) land health assessment and determination are completed for the allotment, unless the improvement would exclude livestock from an area and/or provide protection of GSENM objects. The BLM would prohibit nonstructural range improvements with a primary purpose of increasing forage for livestock.

- ACEC and RNAs (ACECs): Under this alternative, the BLM would designate four RNAs (ACECs).
- Vegetation Management: For all vegetation management efforts, maximize potential for lasting resilient restoration through the preferential use of native vegetation. Nonnative vegetation may be used in restoration efforts as consistent with project and site-specific consideration and rationale. To best support recovery of site integrity and resilience, use adaptive management to ensure that health of these efforts is maintained. The front country and passage areas would focus on proactive management, while the outback and primitive areas would focus on natural processes. New discretionary actions would be avoided within 330 feet of riparian areas in all areas. In the front country, passage, and outback areas, the action must not result in adverse impacts on wetland and riparian areas. In the primitive area, the action must enhance the riparian area.
- Other Discretionary Actions: Alternative C would prohibit soil-disturbing actions in the outback and primitive areas to protect and restore soil health, which is foundational for healthy ecosystems. Areas closed to ROW authorizations would include lands with wilderness characteristics, RNAs (ACECs), ACECs, WSAs, the Old Spanish National Historic Trail, and suitable wild and scenic river segments classified as wild (that are within the outback and primitive areas), and the primitive area. All other lands would be either avoidance areas or open for ROWs, permits, and leases. The BLM would authorize access ROWs to private inholdings, if required by law or regulation.
- Lands with Wilderness Characteristics: All lands with wilderness characteristics in the primitive area would be managed to protect those characteristics (that is, size, naturalness, and opportunities for solitude or primitive and unconfined recreation) while providing for compatible uses. The BLM would manage all lands with wilderness characteristics in the passage and outback areas to minimize impacts on wilderness characteristics while allowing for compatible uses. Only lands with wilderness characteristics in the front country area would be managed for other compatible uses while not protecting wilderness characteristics.
- Transportation and Access: Routes could be maintained and improved to meet public health and safety needs and to protect GSENM objects.

ES.4.4 Alternative D

Alternative D strives to maximize natural processes by minimizing active management and limiting discretionary uses. Land use allocations would curtail discretionary uses, including recreation, livestock grazing, ROWs, and activities under special recreation permits. This alternative would also constrain management actions to emphasize natural conditions, such as passive vegetation management. Alternative D includes the following:

- RMAs: The BLM would designate 10 SRMAs and four ERMAs under this alternative. These RMAs would not cover all lands within GSENM. This alternative would designate the least amount of acres within RMAs.

- **OHV Use:** This alternative would designate more lands as closed to OHV use than any other alternative. Designated road density would be minimized, and siting criteria would be identified to ensure the protection of GSENM objects. No areas would be open to OHV use.
- **Target Shooting:** Recreational target shooting would not be allowed anywhere within the boundaries of GSENM.
- **Recreational Facilities:** Recreational facilities would be allowed in accordance with RMA prescriptions. The BLM would prohibit new facilities in areas outside RMAs, except for signage.
- **Livestock Grazing:** Allotments that are not under permit would be made unavailable for livestock grazing. On allotments that are both in GSENM and Glen Canyon, the pastures and allotments fully within Glen Canyon would be closed to livestock grazing. Additionally, most allotments within departed watersheds would be closed. AUMs allocated to livestock would be based on current active use on lands available for grazing. For all allotments in GSENM, completed land health assessments and fully processed permit renewals would be required within 10 years of the signing of the record of decision. No new structural range improvements would be permitted unless a current (within the last 10 years) land health assessment and determination are completed for the allotment, unless the improvement would exclude livestock from an area and/or provide protection of GSENM objects. Nonstructural range improvements with a primary purpose of increasing forage for livestock would be prohibited.
- **ACEC and RNAs (ACECs):** Under Alternative D, management of the previously designated No Mans Mesa RNA (ACEC) would continue. No new ACECs would be designated.
- **Vegetation Management:** Vegetation management methods would prioritize natural processes and techniques over other methods. New discretionary actions would be avoided within 330 feet of riparian areas unless the action would enhance riparian areas. Nonnative species could only be used with approval or for emergency actions.
- **Other Discretionary Actions:** The BLM would authorize access ROWs to private inholdings, if required by law or regulation. Under Alternative D, the BLM would manage the most acres of ROW exclusion. Under Alternative D, corridor 68-116 would no longer be designated as a 368 Energy Corridor under the Energy Policy Act of 2005, and the BLM would no longer focus placement of major ROWs in that corridor.
- **Lands with Wilderness Characteristics:** The BLM would manage all lands with wilderness characteristics to protect those characteristics (that is, size, naturalness, and opportunities for solitude or primitive and unconfined recreation) while providing for compatible uses.
- **Transportation and Access:** Routes could be maintained and improved to meet public health and safety needs.

ES.5 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Air Resources

Impacts on air quality include fugitive dust generation (for example, from vehicular travel on unpaved roads or from destruction of vegetation and exposure and degradation of soils). Alternative A would result in the greatest level of air quality impacts from fugitive dust and other criteria air pollutant emissions (such as increased volatile organic compounds and carbon monoxide from OHVs and smoke from uncontrolled wildfires), while Alternative D would result in the smallest concentration of pollutants. However, differences across the alternatives would not be significant; the impacts would primarily come from increasing recreation and travel, which would be similar under all alternatives. Within areas closed

to OHV travel, emissions would decrease locally; however, motorists could move and concentrate in areas available to OHV travel, resulting in localized degradation of air quality.

Methane emission from livestock grazing is a primary source of total GHGs from activities in GSENM. Alternative A, with the highest number of allowed AUMs would result in the most methane emissions and impacts on climate change, while Alternative D would have the least impacts. Although prescribed fire and active vegetation management under Alternatives B and C would result in the largest GHG emissions from equipment use, they would not be substantial compared with impacts from grazing. With proper grazing techniques, some of the emitted carbon can be sequestered and stored in soil and vegetation. Active vegetation management under Alternatives B and C would improve vegetation health and diversity, which would increase the carbon sequestration and storage potential in GSENM. Active vegetation management under Alternatives B and C would also improve landscape resiliency to wildfires more quickly compared with Alternatives A or D, which would also offset some of the climate change impacts from other actions.

Soil Resources

Land management actions would directly and indirectly impact soil resources within the decision area, including activities associated with ROW development and special land use designations, recreation management, management of livestock grazing, and vegetation and forest management. The decision area contains several soils with special characteristics and biological soil crusts that may limit the potential of these soils to be suitable or compatible with certain management activities; these soils would be directly impacted by ground-disturbing activities.

All four alternatives would, at a minimum, seek to manage uses to prevent damage to and degradation of soil resources and to ensure that appropriate soil health parameters would be maintained or improved. Additionally, all four alternatives would aim to facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts. Under Alternative A, more acreage would remain open for ROW authorizations, OHV use, recreation, and livestock grazing compared with the other three alternatives, resulting in potentially more ground disturbance that would impact soils and degrade soil health parameters and biological soil crusts. Therefore, more impacts on sensitive soils, biological soil crusts, and soil health and function would be expected under Alternative A. Alternatives B and C would allow a middle ground in terms of acres that would be open to ground-disturbing activities, while Alternative D would generally be the most restrictive alternative.

Vegetation

Alternatives A and B would likely have greater success in moving vegetation conditions toward desired conditions, and increase resiliency of treated areas more quickly and in more areas than Alternatives C or D. This is because Alternatives A and B would increase the amount of proactive vegetation management and use of a wider array of vegetation management methods. This would also benefit special status plant species in the long term by helping to reduce threats such as competition with invasive species and potential for wildlife. It would improve conditions for pollinators, thereby increasing pollination opportunities for special status plants. Prioritizing natural processes under Alternative D and in the primitive management areas under Alternative C could restrict active management of vegetation. Alternatives B and C would increase the options for post-fire stabilization and rehabilitation, including options for native and nonnative seedings and complementary treatments to enhance seeding success.

This would help to maintain and improve vegetation conditions in burned areas to a greater degree than if these options were not allowed.

Alternatives A and B would place the most emphasis on increasing recreational opportunities. This could increase the amount of noxious and invasive species and degrade vegetation and outcompete special status plant species located in recreation areas and along designated routes. It also could increase the potential for human-caused ignitions in these areas. This could result in an increased risk of uncharacteristic fire and decreased vegetation resiliency, compared with management under Alternative D, which would manage fewer of these recreation areas. Of the alternatives, Alternative D would generally include the most allocations to protect lands with wilderness characteristics and other sensitive areas, leading to less impacts on vegetation and special status species from discretionary and compatible uses.

Alternative A would have the most AUMs and acres available to grazing compared with Alternatives B, C, and D. This could result in an increased risk of impacts on vegetation conditions and resiliency due to impacts from improper grazing. Alternative D would have the least number of AUMs and acres available for grazing across all alternatives, which would significantly reduce impacts on vegetation and special status species from grazing.

Regardless of alternative, the planning area will experience increased risk of uncharacteristically large and severe fire due to warmer temperatures, altered precipitation patterns, longer fire seasons, and more extreme fire weather. Climate change effects will combine with and exacerbate some of the effects of the alternatives, especially those that would increase fuels from invasive plants and increase the risk of human-caused fire. These factors would be expected to result in more fire ignitions, more acres burned, and less resilient vegetation conditions.

Water Resources

Under Alternative A, water resources would be managed to protect and maintain water and natural flows, including water flowing into GSENM from adjacent lands. Alternative A is less protective against impacts than Alternatives C and D because it allows new water developments with no restriction, where Alternative C would only allow new water developments in the front country and passage area and Alternative D would prohibit new water developments unless beneficial for natural resource maintenance, restoration, or protection of GSENM objects.

Under Alternative B, resources would be managed to maximize the potential for discretionary actions that are compatible with the protection of GSENM objects. Alternative B provides additional goals of management related to maximizing goals and objectives of GSENM, rather than just maintaining the current hydrology/water quality.

Alternative A is less protective against impacts than Alternative B because under Alternative A, maintenance of existing water developments is to improve livestock and wildlife distribution, while maintenance of water developments under Alternative B would be done to protect, restore, and/or increase the resiliency of GSENM objects.

Alternatives C and D would be the most protective of hydrology within GSENM. Under Alternative C, resources would use area management to carefully allow for discretionary uses in appropriate settings. Alternative C would be more protective of water supply than Alternative B. In the front country area, Alternative C would allow development and maintenance of water sources to support recreation and

visitor-related uses. In the passage, outback, and primitive areas, it is the same as Alternative D in that it would prohibit new recreation related water developments, unless necessary for natural resources maintenance, restoration, or protection of GSENM objects. Additionally, under Alternative C, in the primitive area, new water developments would be prohibited unless a primary purpose of the water development is to protect or restore the resiliency of GSENM objects; and it would maintain water developments for livestock or wildlife or modify them if it protects, restores, and/or increases resiliency of GSENM objects. These management directions would be the same as Alternative D; however, in the front, outback, and passage areas, these water developments would be allowed if they contribute to the protection, restoration, and/or increase the resiliency of GSENM objects, the same as Alternative B.

Under all alternatives, measures are required to stabilize soils and minimize surface water runoff for actions on slopes greater than 10 percent. Surface-disturbing activities result in disruption or damage of biological soil crusts and create opportunities for the establishment and spread of noxious weeds that provide less vegetative cover than native species (Scott et al. 2017). Impacts on water resources that are associated with soil erosion water development include decreased water quality in groundwater and surface water and the potential for contamination to groundwater. Management under Alternatives C and D are more protective against impacts on water resources than Alternative A because Alternatives C and D prohibit soil disturbing actions on areas where soils are mapped and considered as fragile, which can affect water resources through increased erosion and sedimentation, alterations to geomorphology, natural flood control, and pollutant loading.

Noxious Weeds and Invasive, Nonnative Plants

Alternatives A and B, in comparison with Alternatives C and D, would likely have greater success in moving vegetation conditions toward desired conditions, which includes a reduction or eradication of noxious and invasive, nonnative species. Alternative A and B would increase resiliency of treated areas more quickly and in more areas through proactive vegetation management and using a wider array of vegetation treatment methods than Alternatives C or D. Prioritizing natural processes under Alternative D and in the primitive management areas under Alternative C could restrict active management of vegetation.

Alternatives B and C would also increase the options for post-fire stabilization and rehabilitation, including options for native and nonnative seedings and complementary treatments to enhance seeding success. This would help to reduce the establishment and spread of noxious and nonnative, invasive species in burned areas to a greater degree than if these options were not allowed.

Alternatives A, B, and C would place the most emphasis on increasing recreational opportunities, including for motorized and nonmotorized recreation. This could increase the amount of noxious and nonnative, invasive species and fine fuels in recreation areas and along designated routes. This could result in an increased risk of uncharacteristic fire and decreased vegetation resiliency, compared with management under Alternative D, which would manage fewer of these recreation areas. Alternative A also allows for open OHV travel which would increase vectors of weed spread across GSENM. Of all the alternatives, Alternative D would generally include the most allocations to protect lands with wilderness characteristics and other sensitive areas, leading to less impacts from compatible uses.

Alternative A would have the most AUMs and acres available to grazing compared with Alternatives B, C, and D. This would result in increased surface disturbance and vectors for noxious and invasive species

spread. Alternative D would have the least number of AUMs and acres available for grazing across all alternatives, which would significantly reduce the influence of grazing on weed spread in these areas.

Regardless of alternative, the planning area will experience increased risk of uncharacteristically large and severe fire due to warmer temperatures, altered precipitation patterns, longer fire seasons, and more extreme fire weather. Climate change effects will combine with and exacerbate some of the effects of the alternatives, especially those that would increase invasive plants and increase the risk of native communities converting to invasive-dominated communities. These factors would be expected to result in increased fuels from invasive plants, more fire ignitions, more acres burned, and less resilient vegetation conditions.

Cultural Resources

Under Alternative A, plan elements specific to cultural resources would remain from the 2020 Approved RMPs. These plan elements include direction for the identification, preservation, and protection of cultural resources; the reduction of threats and conflicts from other resources; restoration and stabilization of cultural resources; opportunities for traditional use; and the development of cultural resource management plans. Under each action alternative, plan elements specific to cultural resources would be similar in intent to those of Alternative A. However, they would move the plan elements—reducing the threats and conflicts, restoring and stabilizing important and at-risk resources, and providing opportunities for traditional uses—from goals and objectives to management directions. This would make them more action oriented and add detail, such as specific direction to avoid, reduce, or remove imminent and long-term threats and to identify, monitor, and stabilize at-risk cultural resources.

Alternatives B, C, and D include a plan element to employ the cultural resources predictive model to manage authorizations in high-probability areas; Alternative A does not include this plan element. The model statistically evaluated the relationships between known site locations and environmental variables to predict the likely occurrence of cultural resources across GSENM. Under Alternative A, the highest number of known cultural resources, and the most acres with a high probability for cultural resources, could be impacted from management decisions. Project-specific Section 106 compliance would seek to avoid, minimize, or mitigate any adverse effects on cultural resources however, the risk for unintentional impacts would be greatest under Alternative A.

Alternatives B, C, and D include management decisions related to a variety of resources that reduce the potential for impacts on cultural resources, compared with Alternative A. Alternative D would offer the greatest reduction for potential impacts on known cultural sites and in areas with a high probability for cultural resources. While there would be fewer acres of ACECs and RNAs (ACECs) to potentially protect unknown resources under Alternative D, compared with Alternatives B and C, this is counteracted by the greater acreages of provisions limiting ground-disturbing activities under Alternative D, such as visual resource management (VRM) classifications, lands with wilderness characteristics management, livestock grazing unavailability, ROW exclusion, and OHV closures. Alternative A includes the greatest number of allotments that are available for grazing and, therefore, the highest risk to cultural resources. Alternatives B, C, and D offer an increasing amount of reduction, respectively, of potential adverse impacts on cultural resources within allotments, compared with Alternative A.

Tribal Interests

Under Alternative A, current conditions and trends influencing impacts on tribal interests, such as water resources, plant communities, and cultural landscapes, would continue as they are now. Many aspects of management related to a diversity of resources would influence impacts on tribal interests under the alternatives considered. Alternative A would have the largest impacts on tribal interests from cultural resource management, livestock grazing, travel management, OHV use, management of lands with wilderness characteristics, designation of RMAs, and ROW development. Acreages of land management allocations and management directions that would influence these impacts change with each alternative, with the allocations under Alternative D generally being the most protective of tribal interests. Although Alternative D would offer the most protection to tribal interests through restriction of discretionary uses.

Alternatives B, C, and D contain additional identical management direction related to tribal co-stewardship. Alternative A provides general guidance for tribal co-stewardship; however, under Alternatives B, C, and D, this guidance would be more explicit in directing how to protect tribal interests and foster tribal involvement in the land use planning process.

Paleontological and Geological Resources

Under Alternative A, paleontological resources would continue to be managed in accordance with the 2020 GSENM and KEPA RMPs, except where those management decisions do not align with the Proclamation. While specific goals, objectives, and management direction varies slightly between Alternative A and Alternatives B, C, and D, many of the key elements are the same. For Alternatives B, C, and D, management includes slightly more emphasis on implementation of plans and management strategies in addition to development of protocols.

Management for other resources, including vegetation management, maximum soundscape decibels on the A-weighted scale, and group size limits, could have an impact on paleontological resources. For example, more invasive vegetation management options authorized under Alternative A, or possibly allowed under Alternatives A and B, would result in more ground disturbance, and if in an area with paleontological resources (such as potential fossil yield classification Class 4 or 5) could result in increased potential for impacts. Whereas limitations on maximum decibels on the A-weighted scale in specific or defined locations under Alternatives B, C, and D could limit the types of paleontological resource excavation equipment, including handheld devices (such as jack hammers and rock saws) that could be used (unless exceptions are allowed). Group size limits could limit the maximum number of field crew members in specific locations; this is most restrictive under Alternative D. Additionally, for all alternatives, soil management and VRM may require additional approvals prior to paleontological excavation (such as on slopes greater than 30 percent) or after an excavation is initiated but not completed within a specific period (such as 2 or 3 years).

Based on potential fossil yield classification Classes 4 and 5 acres, Alternative A has the greatest potential for impacts to paleontological resources from ROW authorization, RMA, OHV travel, and grazing management decisions. Under Alternative A, the smallest acreage would be protected through the management of special areas (such as RNAs [ACECs] and lands with wilderness characteristics).

Special designations and restrictions on surface disturbance reduce the potential for impacts on paleontological resources as they would restrict the frequency and extent of surface-disturbing activities and recreation uses that could adversely affect paleontological resources. Thus, compared with Alternative

A, management under Alternatives B, C, and D would reduce potential impacts on paleontological resources as they all include an increase in area managed as limited or closed for specific ground-disturbing activities.

Under Alternative A, there are no defined goals, objectives, or management directions for geological resources (or unique geological features). In contrast, Alternatives B, C, and D provide geological resource management directions for identification of geological sites appropriate for public access and proactively maintaining an annual inventory, monitoring of, and, where appropriate, collecting and curating geological resources, with a focus on areas identified in Proclamation 10286.

Fish and Wildlife

Many goals, objectives, management directions, and allocations for wildlife and fish would remain the same or be similar under all alternatives. These directives provide protection for wildlife and habitats while allowing for other discretionary uses. Management direction for all alternatives would include limiting discretionary uses to protect and recover special status species' (BLM Utah sensitive species and federally listed threatened, endangered, proposed, or candidate plant, animal, or fish species) habitats and populations.

Alternative A would allow for maximum discretionary uses and emphasize management flexibility. Under Alternative A, current trends pertaining to wildlife and habitat, including special status species, would likely continue. Alternative B would emphasize flexibility in planning-level direction to maximize the potential for an array of discretionary actions that would be compatible with the protection of GSENM objects. The allowance of discretionary actions under Alternative B would likely result in impacts on wildlife, including special status species, and wildlife habitat that would be similar to the impacts under Alternative A.

Alternative C would emphasize the protection of intact and resilient landscapes using an area management approach to allow for discretionary uses in appropriate settings. Under Alternative C, more protection in the outback and primitive areas would likely reduce impacts on wildlife in those areas as compared with Alternative A. The front country and passage areas would allow for more discretionary uses and therefore would likely have similar impacts on wildlife and habitat as Alternative A. However, because proactive management would not be prioritized, habitats in the outback and primitive areas could restrict the use of tools that would be beneficial for habitat improvements.

Alternative D would maximize natural processes by limiting discretionary uses. This alternative would also constrain management actions to emphasize natural conditions, such as passive vegetation management. Alternative D would protect more wildlife and habitat through land use allocations and therefore reduce impacts on wildlife and habitat as compared with Alternative A. However, by emphasizing natural processes as opposed to active management, this alternative would also limit some management actions or extend the time it would take to achieve desirable conditions that could improve wildlife habitat.

Visual Resources

Alternative A would continue to manage large portions of GSENM under VRM Class I and II objectives where management activities would preserve or retain the natural landscape character and not attract the attention of casual viewers. Under Alternative A, the BLM would continue to manage portions of landscapes inventoried as having high scenic quality under VRM Class III and IV objectives where

management activities could moderately alter (VRM Class III) or dominate (VRM Class IV) the characteristic landscape.

Alternatives B, C, and D would not manage any GSENM lands with VRM Class IV objectives. They, therefore, would not allow for major modification of the characteristic landscape. In Alternative B, the portion of The Cockscomb within the congressionally designated utility corridor along U.S. Highway 89 would be managed with VRM Class III objectives though it inventoried as a high scenic quality landscape; this would allow future utility projects to moderately alter the area's landscape character. Under Alternative C no landscapes inventoried as having high scenic quality would be managed for VRM Class III objectives. Alternative D would only assign VRM Class I or II objectives to GSENM lands, resulting in all landscapes retaining their landscape character.

Under Alternatives A and B, between approximately 47 percent and 51 percent of GSENM lands would be managed with VRM Class I objectives where only negligible and natural process changes to landscape would be allowed; under Alternative C the acres would increase to 57 percent, and under Alternative D they would increase to 77 percent. Under Alternatives A and D, approximately 25 percent of lands would be managed as VRM Class II objectives, which allow only minor changes in the landscape character such that the attention of the casual observer is not attracted. Under Alternative B and C, approximately 30 percent of GSENM would be managed for VRM Class II objectives. Alternatives A and B would allow for the most acres to be managed as VRM Class III (19 percent) where projects could modify the landscape character such that changes could attract the attention of the casual observer, and Alternative D would not allow any lands to be managed to these objectives. Alternative C would allow for 8 percent of GSENM to be managed with VRM Class III objectives. Only Alternative A allows for any lands within GSENM (12 percent) to be managed for objectives that allow major modification of the landscape character (VRM Class IV).

VRM Class I and II objectives are the more protective of scenic values. Comparing alternatives, Alternative D is the most protective because it manages the entire GSENM under these two VRM classes. The level of protection lessens across alternatives from C to B to A, with Alternative A being the least protective of scenic values with 20 percent of the GSENM managed as VRM Class III and 12 percent VRM Class IV.

Dark Night Skies

Under Alternative A, existing trends associated with dark night skies would continue. Under Alternatives B, C, and D, the BLM would seek International Dark Sky Place status for GSENM. Because the BLM does not have the ability to restrict or prohibit lighting outside GSENM, impacts on dark night skies from adjacent communities and more distant cities would be similar under all alternatives. Alternatives C and D would be the most protective of dark night skies, followed by Alternative B, with Alternative A resulting in the greatest potential impacts on dark night skies.

Natural Soundscapes

Under Alternative A, the application of BMPs outlined in the 2020 GSENM RMPs would continue with no specific areas identified where noise-producing facilities would be prohibited, no limitation on where drone takeoffs and landing could occur, and no further limitations on where OHV use could occur. These would result in continued impacts on soundscapes within GSENM.

Alternatives B, C, and D would identify specific areas where no noise-generating facilities could occur. They also would include additional management prescriptions to limit noise in other areas, limits on where drones can take off and land, identification of appropriate landing areas and landing strips for aircraft, and the expansion of areas closed to OHV use. These would result in further protection of soundscapes compared with Alternative A. Additionally, Alternatives B, C, and D would establish quiet hours at campgrounds, designated camping locations, and other locations, including potential intermittent noise from generators associated with recreational use. These quiet hours would further protect soundscapes where concentrated recreation use occurs. Noise-producing facilities would be most limited under Alternatives C and D because these alternatives identify larger portions of GSENM as either closed to OHV use or where noise-generating facilities would be specifically prohibited.

Under Alternative A, increased noise levels could occur near all of the GSENM noise-monitoring locations, whereas Alternatives B, C, and D would further protect soundscapes adjacent to these monitoring locations. To restore natural soundscapes, under Alternatives B, C, and D, existing facilities that generate sounds would be retrofitted to reduce sound generated below the identified thresholds under each alternative, to the extent possible.

Fire and Fuels Management

Alternatives B and C would likely move the vegetation condition and fuel loading toward desired conditions, and increase resiliency of treated areas more quickly and in more areas than Alternatives A or D. Alternatives B and C would increase the amount of proactive vegetation management to reduce hazardous fuels, and would allow a wider array of vegetation management methods than under Alternative A. Alternative D, using only natural processes would not be as effective in vegetation communities that are most departed from historical conditions, due to the amount of hazardous fuel loading in these areas and the increased potential for catastrophic wildfire. Alternatives B and C would also increase the options for post-fire stabilization and rehabilitation relative to Alternatives A and D, including options for native and nonnative seedings and complementary treatments to enhance seeding success. This would help maintain the vegetation condition and fire regime in burned areas to a greater degree than if these options were not allowed.

Alternatives A, B, and C would place the most emphasis on increasing recreational opportunities. This could increase the amount of fine fuels in recreation areas and along designated routes and increase the potential for human-caused ignitions in these areas. This could result in more fires and more acres burned, compared with management under Alternative D, which would manage fewer of these areas. When fires ignite in GSENM, allocations to protect lands with wilderness characteristics and other sensitive areas, could make fire response more complex or difficult; this is because some response methods could be restricted to protect the wilderness character or other sensitive resources. Of the alternatives, Alternative D would generally have the most of these allocations.

Regardless of alternative, the planning area will experience an increased risk of uncharacteristically large and severe fire due to warmer temperatures, altered precipitation patterns, longer fire seasons, and more extreme fire weather. Climate change effects will combine with and exacerbate some of the effects of the alternatives, especially those that would increase fuels from invasive plants and increase the risk of human-caused fire from more recreational use. These factors would be expected to result in more fire ignitions, more acres burned, and movement away from historical vegetation conditions and fire regimes.

Lands with Wilderness Characteristics

Alternative A would continue to manage all lands with wilderness characteristics to allow for other uses. By comparison, Alternative B would manage 72,000 acres for the protection of wilderness characteristics, while Alternative C would manage 190,100 acres of lands with wilderness characteristics for the protection of those characteristics. Under Alternatives B and C, compatible uses may be allowed on other lands with wilderness characteristics so long as those activities are consistent with the protection of GSENM objects. Alternative D would manage all lands with wilderness characteristics in GSENM (559,600 acres) for the protection of those characteristics. Under Alternatives A, B, and C, managing lands with wilderness characteristics to allow for other multiple uses or for other compatible uses could increase the impacts on the size, apparent naturalness, outstanding opportunities for solitude or primitive, unconfined recreation, and supplemental values.

Forestry and Woodland Products

Alternative A is the only alternative under which areas (984,500 acres) would be open to commercial harvest of woodland products. Alternatives B, C, and D would not allow for commercial harvest of woodland products. Noncommercial harvest of woodland products would be allowed on 984,500 acres under Alternative A, 906,300 acres under Alternative B, 88,000 under Alternative C, and prohibited (with some exceptions) under Alternative D.

Livestock Grazing

Alternative A allows for the most available acres (2,134,800) for livestock grazing and the most AUMs for permitted use. Additionally, Alternative A would activate all inactive AUMs within suspended pastures or allotments, increasing the overall availability of forage over the long term, as rangeland conditions allow. Compared with Alternative A, Alternatives B and C would reduce the acres available for livestock grazing by 97,500 acres (5 percent) and 207,800 acres (10 percent), respectively, while Alternative D would reduce the available acres by 46 percent (984,800 acres). Vegetation management under Alternative B would likely have the greatest positive impact on rangeland health across the planning area, as it would emphasize widespread restoration, including seedings with native and nonnative species. Alternative C would manage the most acres of SRMAs, having the highest potential for recreation-livestock conflicts in these areas.

Recreation

Under all alternatives, management for recreation would have long-term beneficial effects on GSENM's associated objects. Of all alternatives, Alternative C would include the greatest designation of SRMAs; therefore, it would provide the most prescriptive recreational management.

Alternative A includes the greatest portion of the decision areas as ERMAs, which could provide greater management flexibility to adapt to changes in recreational use and facility needs compared with the other alternatives. Alternative B would result in similar impacts on recreation from designation of RMAs as under Alternative A, with slightly different recreation decisions associated with the different SRMA, ERMA, and RMZ designations. Alternative D would designate the fewest acres within RMAs of all alternatives. It would limit the BLM's ability to manage for recreational opportunities; this would ultimately limit the beneficial outcomes of recreation compared with the other alternatives.

Alternative A includes the most acreage available for recreational target shooting, which would continue to result in the potential displacement of recreationists seeking other recreation opportunities, which

could result in conflicts with other recreational users in GSENM. Alternative B would limit access for recreational target shooting, compared with Alternative A, because it manages more acreage as closed to recreational target shooting. Alternative C would limit access the shooting sports community to a larger extent than Alternatives A and B because it would manage more acreage as closed to recreational target shooting. Under Alternative D, the BLM would prohibit recreational target shooting across the entire GSENM. This would reduce the potential for conflicts with other recreational users compared with all other alternatives, but it also would eliminate access for all recreational target shooting. This could lead to instances of unauthorized target shooting in GSENM.

Alternative A would be the only alternative that would allow for open cross-country OHV travel. This would provide the greatest access to OHV opportunities, could reduce unauthorized off-trail travel in other areas, and reduce conflicts between motorized recreations, compared with Alternatives B, C, and D. This would continue to result in damage to resources such as native vegetation that could be considered inconsistent with the protection of GSENM's objects. Alternative B would eliminate access for cross-country OHV recreation across GSENM. This could result in unauthorized cross-country OHV travel occurring in certain areas and reduce access for motorized users. Motorized users would likely experience greater conflicts with nonmotorized recreationists on motorized routes in OHV limited areas, as this mileage would be substantially less in Alternative B than in Alternative A. Alternative B would also likely decrease the ability of all recreationists to access nonmotorized trails in certain areas due to the greater area managed as closed to OHV use. Alternative C would result in similar impacts on travel resulting from OHV area designations as under Alternative B, but to a greater extent due to the greater area managed as closed to OHV use. Under Alternative D, the BLM would manage the most acreage as closed to OHV travel of all the alternatives. This would limit resource damage from cross-country OHV travel, decrease impacts on natural settings and primitive recreational experiences, and limit access for authorized all-terrain vehicle and utility-task vehicle recreation. Reduced motorized access could limit accessibility and nonmotorized opportunities in remote areas.

Pedestrian use would be allowed throughout GSENM under all alternatives. Under all alternatives, the establishment of additional recreational infrastructure would enhance recreational opportunities. Alternative A would not specifically address recreational facilities, but there would be few restrictions outside WSAs where development could occur. Alternatives B, C, and D would allow for recreational facilities to provide for future recreational needs, with the most restrictions on the location of facilities under Alternative D. Land use allocations would be the most limited under Alternative D and would curtail discretionary uses, including recreation and activities under special recreation permits.

Travel Management

Potential effects on travel management would occur to varying degrees across alternatives. Route designations are implementation-level decisions that will be analyzed and approved in accordance with the BLM's travel and transportation regulations at 43 CFR 8340 separately through the travel management planning process. This process evaluates and designates routes to provide a high-quality travel network for a wide variety of uses. Examples of beneficial impacts of designating routes through a travel management plan include improved access, experience, and connectivity; the promotion of safety for all users; minimization of conflict among various uses of BLM-managed lands; and reduction in route redundancy, resource degradation, and habitat fragmentation in the planning area. Travel management plans may also provide an opportunity for coordinating transportation planning with Kane and Garfield Counties or adjacent communities. Such coordination could reduce access issues and management

conflicts, improve the safety and convenience of the traveling public, and provide a more sustainable use of resources.

Alternative A is the only alternative that allows for any open cross-country OHV travel; specifically, in the Little Desert RMZ. This would provide beneficial recreational experiences for some users and could avoid instances of cross-country OHV travel in closed areas or areas limited to designated routes. Alternative A would yield the greatest benefits to travel, transportation, and access because it would manage the fewest acres of OHV closed areas of the alternatives. Management direction for landings and takeoffs of motorized aircraft in GSENM is not described in the 2020 Approved RMPs. This would yield the greatest benefits to access for motorized aircraft use because it does not place any restrictions on motorized aircraft use. However, this could limit the ability of the agencies to protect GSENM objects compared with Alternatives B, C, and D.

The BLM would manage the most acreage as closed to OHV use under Alternative D, limiting the potential for resource damage from OHV travel. Management under Alternative D would be most likely to adversely affect transportation and access for OHVs due to the scale of OHV closures.

Under Alternatives B, C, and D, routes could be maintained and improved to meet public health and safety needs. Appropriate landing areas and landing strips for aircraft would be considered to varying degrees under Alternatives B, C, and D, which could allow for increased aircraft access compared with Alternative A.

Lands and Realty

Under all alternatives, any pending ROW and land use authorizations applications or renewals are expected to be resolved. The 137 active ROWs and land use authorizations on BLM-managed land would continue to be managed under the direction of each alternative. The BLM would also likely increase land acquisitions in GSENM. This is due to an increase in funding and staffing to the BLM land acquisition program, as well as a rise in willing seller interest.

Under Alternative A, all lands outside WSAs would be either avoidance areas or open for new ROWs, permits, and leases. This would likely increase the number of developments, such as communication sites or utility corridors, because ROWs could be approved so long as they consistent with the protection of GSENM objects. Under Alternative B, there would be more land excluded from ROWs, permits, and leases. Under Alternatives B and C, the BLM could allow renewal and upgrade of existing facilities authorized under a ROW/land use authorization within the decision area. t

Under Alternative C, there would be less land managed as ROW open and avoidance areas, and the BLM would continue to manage land designated as ROW corridors in the planning area for renewals and upgrades; however, new ROWs could be authorized outside of the preexisting designated utility corridors in ROW avoidance areas. Under Alternative D, new ROWs would be authorized in avoidance areas and within the preexisting U.S. Highway 89 utility corridor; however, most lands would be managed as ROW exclusion areas.

Special Designations for Conservation and Protection

Areas of Critical Environmental Concern, Research Natural Areas, and Other Special Management Designations

Through designation of multiple new ACECs and RNAs (ACECs), Alternatives B and C would include the most protections of identified values for ACECs, RNAs (ACECs), and other special management designations. Management actions and impacts would vary by designated unit and include closure to OHV uses, prohibiting recreational target shooting, ROW exclusion, and making the areas unavailable to livestock grazing; however, all would align with the protection and management of identified values and GSENM objects. While management actions remain the same across Alternatives B and C, Alternative B would include the most protections for the greatest area, as multiple new ACECs would be designated, increasing the acreage protected. Alternative D would not designate new ACECs or RNAs (ACECs); however, through discretionary actions of other resources, the identified values of the proposed ACECs and RNAs (ACECs) would continue to be protected in a manner similar to designation of the areas.

Alternative A would include the least amount of protections of identified values for ACECs, RNAs (ACECs), and other special management designations. This is because unlike Alternatives B and C, there would be no additional designations. However, management of GSENM objects would provide sufficient management to protect the identified values.

National Trails

The Old Spanish National Historic Trail Corridor Inventory Project is currently ongoing, and information from that report will be included for impacts analysis as available.

Scenic Routes

Alternative D would provide the highest level of protection of the viewsheds seen from designated scenic byways; this is because the route corridor would extend 5 miles from the route's centerline. The entire corridor would be classified as VRM Class II, which would allow for management activities to be seen but not attract the attention of the casual observer, and any changes would repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. Alternatives B and C would include the same VRM Class II designation, but the designation would only apply to the viewshed as seen from the designated routes within the foreground and middleground areas. This would exclude some areas in the outback area that may be covered by the Alternative D 5-mile corridor. Surface-disturbing impacts could occur in the outback area of the viewshed. Alternative A would continue to manage designated scenic routes to protect the values for which they were established. There would be no management of the viewshed as seen from the designated scenic routes and impacts within the viewshed from surface development or disturbance would continue.

Wild and Scenic Rivers

Alternative D would provide the greatest level of protection for suitable wild and scenic rivers, their free-flowing condition, water quality, identified ORVs, and tentative classifications. The BLM would manage all suitable segments and their corridors as ROW exclusion, except in a designated utility corridor. Alternative C would provide the next-highest level of protection by managing all suitable segments in the outback and primitive areas as ROW exclusions. The BLM would manage all other suitable segments as ROW avoidance, except in a designated utility corridor. Alternative B would provide the second-lowest level of protection with only the suitable segments with wild classification corridors managed as ROW exclusion, except in a designated utility corridor. All suitable segments within WSAs, ISAs, and protected

lands with wilderness characteristics would be managed as VRM Class I. All other segments would be managed as VRM Class II. Alternative A would provide the lowest level of protection with all suitable segments, regardless of classification, managed as ROW avoidance, except in designated utility corridors and VRM Class I for only those suitable segments that fall within WSAs.

Wilderness Study Areas

Alternatives B, C, and D would provide the highest level of protection to WSAs; this is because they would require re-inventorying WSA units for wilderness characteristics upon their release. No new proposals or actions would occur within the WSA units until the BLM completes the wilderness characteristics inventory. Proposals and actions would have to be consistent with the protection of wilderness characteristics, GSENM objects, or implemented for public health and safety. In comparison, Alternative A would not require re-inventory of wilderness characteristics and would only release lands on a case-by-case basis, as directed by Congress. Across all alternatives WSAs would continue to be managed as VRM Class I and ROW exclusion, and closed to OHV use.

Social and Economic Values

Under all alternatives, GSENM would continue to stimulate the local and regional economy through increased jobs, wages, economic output, nonmarket values, and ecosystem services from its uses, such as recreational opportunities and grazing and ranching allotments.

Alternative A would likely provide more economic value from grazing through more jobs, labor income, and economic output than Alternatives B, C, and D, due to the larger number of actual AUMs. Alternative B would likely provide more economic value from grazing than Alternatives C and D, and Alternative C would likely provide more economic value from grazing than Alternative D. Alternatives A, B, and C would likely each provide the same amount of economic value from recreation through jobs, income, and economic output. Alternative D could provide less economic value from recreation than Alternatives A, B, and C, if the BLM management decisions lead to a reduction in visitors due to the increase in acres closed to OHV travel, compared with Alternative A, and the potential for more limited access to products and resources. However, there could be an increase in visitors who are looking to recreate in more remote areas.

Impacts on nonmarket values and ecosystem services would be more difficult to quantify than economic values. Under Alternative D, the BLM would protect the most lands with wilderness characteristics and would place the most restrictions on other uses that would not contribute to the protection of the lands, compared with the other alternatives. This would mean the BLM management decisions under Alternative D would most likely provide more nonmarket value associated with open spaces (such as quality-of-life values), but less nonmarket values associated with recreation and grazing (such as mental and physical health and sense of place) than the other alternatives. Under Alternative A, there would continue to be no lands protected for their wilderness characteristics, which would mean that the BLM management decisions, under Alternative A, would likely provide fewer nonmarket values associated with open spaces, but might provide more nonmarket values associated with recreation and grazing than Alternative D.

Environmental Justice

Under Alternatives B, C, and D, the BLM could maintain and improve routes to meet public health and safety needs. Under Alternatives B, C, and D, public safety concerns could be reduced more than under

Alternative A, which limits improvements to the routes listed in the 2000 Monument Management Plan (BLM 2000, TRAN-7).

Under all alternatives, the BLM's management decisions could impact environmental justice communities who rely on wood harvesting for heating sources or other uses. Under Alternative D, BLM management decisions would limit noncommercial and commercial timber harvesting, which would be the most restrictive of the alternatives. This could disproportionately impact environmental justice communities by restricting access to products; however, reducing use of wood for heating sources could improve air quality for the surrounding community, including environmental justice populations. These impacts would be site specific and would depend on the location and concentration of the wood burning. Under all alternatives, the BLM would continue to coordinate and consult with tribes with ties to GSENM. Also, the BLM would implement mitigation measures that would reduce impacts on tribal communities, such as impacts on timber and wood cutting resources, sustenance resources, and cultural and spiritual resources.

Under all alternatives, the BLM's management decisions would continue to support environmental justice communities through employment, public services, economic output, and nonmarket benefits and ecosystem services. Under Alternative D, there could be less economic contributions from recreation than the other alternatives, if the BLM management decisions lead to a reduction in visitors due to more restrictions on land use and access to products and resources. On the other hand, there could be an increase in visitors who are looking for solitude. These impacts on the economy could affect environmental justice populations; however, the magnitude of this impact would depend on the overall change in visitation numbers. Additionally, the jobs associated with recreation and tourism are often short-term or seasonal positions, which might have limited impact on overall income for local households. If there are fewer overall visitors under Alternative D, there could be a reduction in negative impacts on cultural resources, which would likely impact environmental justice populations. Under Alternatives B, C, and D, there could be an increase in nonmarket benefits associated with more protected lands, compared with Alternative A, which could be especially impactful to minority populations and Tribal Nations who use GSENM for spiritual and traditional uses.

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ACRONYMS AND ABBREVIATIONS

Full Phrase

ACEC	area of critical environmental concern
AIM	Assessment, Inventory, and Monitoring
AMS	analysis of the management situation
ATV	all-terrain vehicle
AUM	animal unit month
BLM	United States Department of the Interior, Bureau of Land Management
BMP	best management practice
°C	degrees Celsius
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO ₂ e	carbon dioxide equivalent
dBa	A-weighted decibel
EIS	environmental impact statement
EPA	United States Environmental Protection Agency
ERMA	extensive recreation management area
ESA	Endangered Species Act of 1973
°F	degrees Fahrenheit
FLPMA	Federal Land Policy and Management Act of 1976
Forest Service	United States Department of Agriculture, Forest Service
FRG	fire regime group
GHG	greenhouse gas
GIS	geographical information system
Glen Canyon	Glen Canyon National Recreation Area
GSENM	Grand Staircase-Escalante National Monument
HAP	hazardous air pollutant
HUC	hydrologic unit code
IMPLAN	Impact Analysis for Planning Model
IPCC	Intergovernmental Panel on Climate Change
ISA	instant study area
IWG	Interagency Working Group on the Social Cost of Greenhouse Gases
KEPA	Kanab-Escalante planning area
KFO	Kanab Field Office
MAC	monument advisory committee
MMP	monument management plan
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act of 1969

NLCS	National Landscape Conservation System
NPS	United States Department of the Interior, National Park Service
NRCS	United States Department of Agriculture, Natural Resources Conservation Service
OHV	off-highway vehicle
ONA	outstanding natural area
ORV	outstandingly remarkable value
OSNHT	Old Spanish National Historic Trail
PFC	proper functioning condition
PFYC	potential fossil yield classification
PM _{2.5}	particulate matter less than 2.5 microns in diameter
PM ₁₀	particulate matter less than 10 microns in diameter
RMA	recreation management area
RMP	resource management plan
RMZ	recreation management zone
RNA	research natural area
ROD	record of decision
ROW	right-of-way
SC-GHG	social cost of greenhouse gases
SDSR	Site Degradation Susceptibility Rating
SRMA	special recreation management area
SRP	special recreation permit
TDS	total dissolved solids
TMDL	total maximum daily load
TMP	travel management plan
UDEQ	Utah Department of Environmental Quality
UDWQ	Utah Department of Environmental Quality, Division of Water Quality
UDWR	Utah Division of Wildlife Resources
U.S.	United States
USC	United States Code
USGS	United States Geological Survey
USFWS	United States Department of the Interior, Fish and Wildlife Service
UTV	utility-task vehicle
VCC	vegetation condition class
VOC	volatile organic compound
VRI	visual resource inventory
VRM	visual resource management
WSA	wilderness study area
WSR	wild and scenic river

Chapter I. Introduction

I.1 INTRODUCTION

On October 8, 2021, Presidential Proclamation 10286 restored the boundaries and management conditions of Grand Staircase-Escalante National Monument (GSENM) to those that were in place prior to Presidential Proclamation 9682, which reduced the size of GSENM and divided it into three units. The purpose of Proclamation 10286 is to “ensure that the exceptional and inimitable landscape of GSENM, filled with an unparalleled diversity of resources, will be properly protected and will continue to provide the living laboratory that has produced so many dramatic discoveries in the first quarter century of its existence.”

Proclamation 10286 directs the Secretary of the Interior, acting through the United States (U.S.) Department of the Interior, Bureau of Land Management (BLM), to create a new management plan for the entirety of GSENM. A resource management plan (RMP) is the principal instrument the BLM uses to guide management of public lands and resources within its jurisdiction.

The Federal Land Policy and Management Act of 1976 (FLPMA) establishes the policy of the United States concerning the management of federally owned land managed by the BLM. The BLM “shall manage the public lands under principles of multiple use and sustained yield ... except that where a tract of such public land has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law” (43 United States Code [USC] 1732(a)). Proclamation 10286—in accordance with the Antiquities Act of 1906—dedicated the lands in GSENM to specific uses by designating the national monument and reserving the entirety of the lands in the restored boundary of GSENM as the smallest area compatible with the protection of its objects.

GSENM is part of the National Landscape Conservation System (NLCS), which was established “to conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations” (Congress.gov 2008). Therefore, the BLM is required to manage GSENM “in a manner that protects the values for which the components of the system were designated” (16 USC 7202). This management mandate may be realized in various ways. The GSENM RMP must reflect the unique issues, management concerns, and resource conditions of the management area while reflecting the purposes set forth in Proclamation 10286.

The BLM Paria River District Office has prepared this Draft RMP/environmental impact statement (EIS) pursuant to the BLM’s regulation for resource management planning found in 43 Code of Federal Regulations (CFR) Subpart 1610 and the National Environmental Policy Act of 1969 (NEPA).

I.2 PURPOSE OF AND NEED FOR ACTION

Purposes and needs serve to frame the identification of issues, alternatives development, and effects analyses. Proclamation 10286 directs the BLM to “prepare and maintain a new management plan for the entire monument” for the specific purposes of “protecting and restoring the objects identified [in Proclamation 10286] and in Proclamation 6920.”

The RMP's underlying purpose (40 CFR 1502.13) is to provide a management framework, including goals, objectives, and management direction, to guide GSENM management consistent with the protection and/or restoration of GSENM objects and the management direction provided in Proclamations 10286 and 6920.

The following purposes are set forward in Proclamations 10286 and 6920, or they have been identified based on key present and historical GSENM management challenges.

1. **Protect and/or restore the entirety of GSENM's large, remote, rugged, and markedly impenetrable landscapes.** GSENM includes extraordinary dark night skies, natural soundscapes, and a rich mosaic of objects of natural, historical, and scientific interest. Utah's large extent of unspoiled natural, roadless areas is unique in the lower 48 states, and Proclamation provided protection to these 1.87 million acres.

The primary purpose of the plan is to protect and/or restore GSENM as a whole, for its value as a unique, unspoiled, and natural landscape and its use as an outdoor science laboratory. GSENM's immense scale and unspoiled naturalness serve as a foundation for the rest of GSENM's objects, including the diversity of ecotypes; geological, cultural, and paleontological resources; vegetation; and wildlife.

Management will address anthropogenic—or human-caused—impacts and challenges. Increases in anthropogenic factors pose diverse challenges for resource preservation (for example, adverse vegetation and soil impacts, loss of geologic and cultural resources, the loss of the potential for human solitude, adverse effects on certain wildlife species, and increases in noise). Incremental and gradual degradation of resources over time, due to ongoing uses, can easily occur unnoticed.

2. **Emphasize GSENM as a living, outdoor laboratory.** GSENM focuses on science and provides for diverse and significant research and discovery related to varied resources and objects. Proclamation 6920, which originally designated GSENM in 1996, states, “[e]ven today, this unspoiled natural area remains a frontier, a quality that greatly enhances the value for scientific study.” Science is the foundational purpose of GSENM.

Through scientifically informed management, GSENM will sustainably provide for scientific pursuits. Given the intensification of human-caused changes in the world, undisturbed and unaltered natural landscapes on the geographic scale of GSENM are increasingly essential, rare, and hard to maintain. Accordingly, GSENM is equally important both for scientific understanding of the past and for understanding changes and trends that allow us to appropriately plan for and understand the future.

3. **Protect and/or restore GSENM's biological resources.** GSENM supports a range of ecotypes, as well as reference populations, across the landscape's substantial range of elevation and large geographic extent. Due to the remoteness and substantial variation in elevation and topography, GSENM contains five life zones, a variety of habitats, multiple ecoregions, unique and isolated plant communities, and a diversity of invertebrates, birds, reptiles, and mammals.

The BLM will manage species within interconnected communities and ecosystems. Climate change and drought are pushing ecological conditions outside the historical range of variability, affecting the function and resilience of vegetation and, in turn, habitats and species. Accordingly, ecotypes, vegetation communities, and habitats will be managed for resilience.

4. **Protect GSENM's cultural and historic resources.** GSENM provides for scientific, tribal, and public uses cultural resources. Cultural resources are locations of human activity, occupation, or use that contain materials, structures, or landscapes that were used, built, or modified by people. Cultural resources include archaeological sites, buildings, structures, objects, districts, and locations associated with cultural practices or beliefs of contemporary communities, including Tribal Nations.

Discretionary uses, including livestock grazing and rising visitation levels, pose challenges for archaeological and historic resource protection and for tribal access and uses (for example, Tribal Nations with ties to GSENM have appropriate access to traditionally sacred places and landscapes). Management will provide for varied access and uses, while protecting cultural and historic resources.

5. **Protect GSENM's geology, paleontology, and scenic landscapes.** GSENM landscapes contain unique geological resources, world-class paleontological resources, and extraordinary scenery. Scenic exploration can be accessed via paved and unpaved roads that serve as arteries through GSENM.

Geological and paleontological resources will be protected; they also will be appropriately available for scientific use and public enjoyment. Scientific uses require access and resource protection.

6. **Protect and/or restore opportunities to experience GSENM's remote landscape and associated adventure and self-discovery.** While not identified as an object in need of protection, Proclamation 10286 acknowledges world-class recreational opportunities in GSENM. Most visitation to GSENM is recreational, and high and increasing levels of recreational visitation are a top management challenge. Large numbers of visitors can both degrade the visitor experience and impede protection of GSENM objects, including ecologically sensitive areas and species.

The BLM will sustainably protect and/or restore GSENM's objects and remote, fragile landscape amid rapidly rising visitation levels. The BLM also will provide diverse recreational opportunities and basic facilities.

7. **Manage discretionary uses in GSENM in the context of protecting, maintaining, or restoring GSENM objects.** GSENM lands have long served a variety of uses and purposes for Tribal Nations, European settlers, and the descendants of both. Since the designation of GSENM in 1996, there has been controversy regarding the BLM's discretionary uses within the context of GSENM preservation mandates.

Discretionary uses will be compatible with sustainable protection and/or restoration of GSENM's objects.

I.3 PLANNING AREA AND DECISION AREA

GSENM was established to protect one of the last large-scale, unspoiled natural landscapes in the lower 48 states, including for the purposes of scientific investigations. Utah has long contained extensive roadless and previously unmapped areas, although that is changing due to exceptional rises in both visitation and the residential population. GSENM is adjacent to remote rural communities, agricultural and range lands, and various federal, state, and county lands. GSENM contains diverse geological features, including a sequence of unique sedimentary rock layers that extends from the central part of GSENM to its southern

boundary; this sequence of layers is known as “the Grand Staircase.” Other broadscale landscape features of GSENM include the Escalante Canyons in the northeast portion of GSENM; the Paria River Canyon and associated tributaries that bisect GSENM from north to south; and the Kaiparowits Plateau, a largely roadless area that comprises much of the central region of GSENM containing a variety of terrain, such as steep walled canyons, escarpments, towers, arches, and a series of benches, with vegetation ranging from ponderosa pine forests, pinyon and juniper woodlands, and aspen groves on Fiftymile Mountain to sparse desert shrub and grasslands on Nipple Bench.

The scenic values of GSENM are rare and outstanding, attracting large and growing numbers of recreationists and international visitors. GSENM also contains diverse, extensive, and rare biotic, paleontological, and archaeological resources. GSENM includes areas that:

- Support hydrologic research and management due to inclusion of three nearly complete watersheds that descend from the forests of the Aquarius Plateau and Boulder Mountain to pinyon-juniper woodlands, and finally to warm-temperate desert shrublands at the southeastern edges of GSENM near Glen Canyon National Recreation Area (Glen Canyon).
- Facilitate climate change understanding and enhancement of the potential for managing and studying landscape resilience; this is because GSENM contains a span of elevation and ecotypes. This span fosters observation of changes within, and possible species migrations across, diverse ecotypes.
- Contain one of the most floristically diverse regions in the Intermountain West. As a result of the blending of warm- and cold-desert flora, and the high number of species native to the landscape, an abundance of unique, isolated plant communities can be found, including half of Utah’s rare flora and 125 species of plants unique to Utah and the Colorado Plateau.
- Contain an outstanding biodiversity of bees, including several endemic species, due, in part, to the area’s substantial elevation gradient, diversity of habitats, and abundance of flowering plants.
- Contain paleontological resources, including globally critical Cretaceous-aged dinosaur resources that are accessible due to the excellent exposures of their host geological formations. Ongoing paleontological discoveries will continue to make invaluable contributions to understanding of the planet’s past.
- Contain an outstanding density and diversity of archaeological and historic sites. Evidence of habitation by the Ancestral Pueblo and Fremont Cultures, as well as early European settlement, is found in abundance and provides insight into human interaction with this unique environment.

GSENM is near or adjacent to areas of national and international significance, including Bryce Canyon National Park, Zion National Park, Capitol Reef National Park, the North Rim of the Grand Canyon, Glen Canyon, Pipe Spring National Monument, Cedar Breaks National Monument, Grand Canyon-Parashant and Vermilion Cliffs National Monuments, Kodachrome Basin State Park, Escalante Petrified Forest State Park, and Coral Pink Sand Dunes State Park. Small communities are on GSENM’s perimeter. Their economies are intertwined with livestock grazing and the recreational opportunities that exist both at GSENM and the surrounding areas of national and international significance, which draw local, national, and international visitors.

Federally recognized tribes with direct ties to the GSENM area include the Kaibab Band of Paiute Indians, Navajo Nation, Paiute Indian Tribe of Utah, Shivwits Band of Paiute Indians, Hopi Tribe of Arizona, and

Ute Mountain Ute Tribe. In addition, this RMP/EIS will include further engagement with the following tribes that have ancestral and cultural ties to the planning area: the All Pueblo Council of Governors, Pueblo of Acoma, Pueblo of San Felipe, Pueblo of Tesuque, Pueblo of Zuni, San Juan Southern Paiute Tribe of Arizona, and Ute Indian Tribe of the Uintah and Ouray Reservation.

The BLM's Land Use Planning Handbook (H-1601-1) differentiates between geographic areas associated with planning. These areas include the planning area and decision area. The planning area is the region within which the BLM will make decisions during a planning effort. A planning area boundary includes all lands regardless of jurisdiction; however, the BLM will only make decisions for the decision area, which is limited to lands managed by the BLM. For the purposes of this RMP/EIS, the planning area refers to the entire area outlined in **Figure I-1**. **Table I-1** details the surface ownership within the planning area.

Table I-1. Surface Ownership in the Planning Area

Surface Ownership	Acres
BLM (surface decision area)	1,865,600
Private	14,800
Planning area total	1,880,400

Source: BLM geographic information system (GIS) 2022

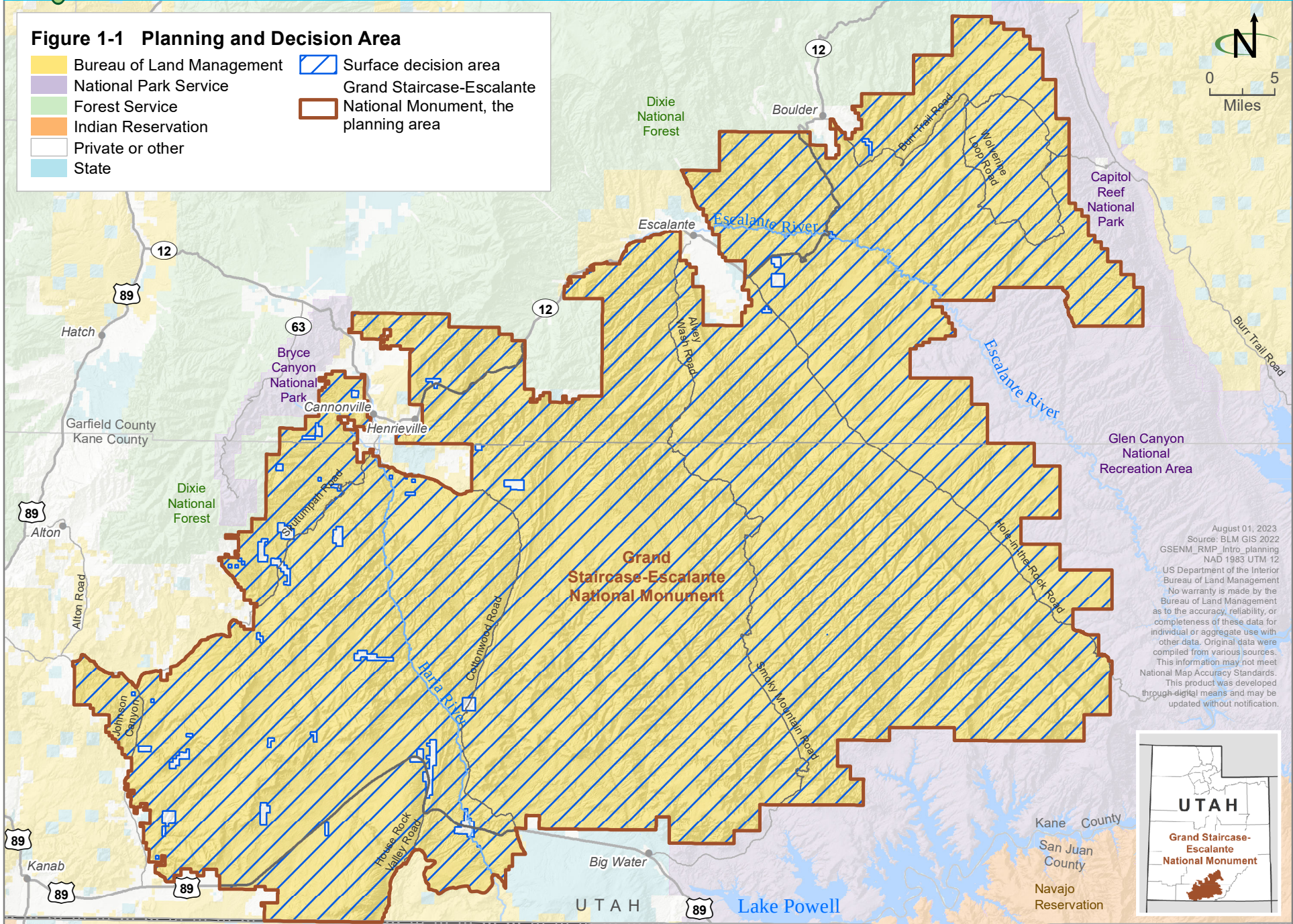
Of the approximately 1,880,400 acres of land within the planning area, the RMP/EIS will make decisions for approximately 1.87 million acres of public land managed by the BLM. This is known as the decision area. The decision area does not include state, municipal, or private lands. While this RMP/EIS analyzes management actions applicable to livestock grazing allotments in the U.S. Department of the Interior, National Park Service (NPS) and the BLM Arizona Strip Field Office, these management actions will not be authorized by the subsequent ROD or included in the Approved RMP. Decisions associated with these management actions would be made by the respective agency and field office in subsequent decision documents.



Grand Staircase-Escalante National Monument

Figure 1-1 Planning and Decision Area

- Bureau of Land Management
- National Park Service
- Forest Service
- Indian Reservation
- Private or other
- State
- Surface decision area
- Grand Staircase-Escalante National Monument, the planning area



August 01, 2023
 Source: BLM GIS 2022
 GSENM_RMP_Intro_planning
 NAD 1983 UTM 12
 US Department of the Interior
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 No warranty is made by the
 Bureau of Land Management
 as to the accuracy, reliability, or
 completeness of these data for
 individual or aggregate use with
 other data. Original data were
 compiled from various sources.
 This information may not meet
 National Map Accuracy Standards.
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 through digital means and may be
 updated without notification.



I.4 ISSUES CONSIDERED

During the scoping process, the BLM received comments from members of the public and various public, governmental, and nongovernmental groups. This feedback has been compiled to describe issues and analysis concerns that are discussed in this document. During the scoping period, individual comments received were evaluated to determine whether they constituted issues relevant to this planning process. Issues are defined as concerns regarding the effects that the proposed action has on resources. Issues can drive the development of an alternative; they may involve resources that are adversely affected by the proposed action or involve unresolved conflicts regarding alternative uses of available resources. Planning issues provide focus for the analysis and are used to compare and contrast the environmental effects of the alternatives.

I.4.1 Issues Considered in this Environmental Impact Statement

Relevant issues discussed in this EIS are as follows:

- How would proposed management actions and land use allocations contribute to air pollutant emissions and affect air quality and visibility?
- What would be the expected contribution to greenhouse gas (GHG) emissions from proposed management?
- How would proposed management affect long-term carbon storage and sequestration in GSENM?
- How would proposed management affect biological soil crusts?
- How would proposed management affect vulnerable soils?
- How would proposed management affect soil health and ecological function?
- How would existing and proposed land use allocations and discretionary uses affect terrestrial vegetation, including special status plant species?
- How would vegetation management and restoration approaches affect landscape-scale ecological functioning, terrestrial vegetation, and special status plant species?
- How would management decisions of activities that disturb soils and accelerate erosion affect water resources (groundwater, surface water, wetlands, riparian areas, floodplains, and water quality)?
- How would proposed management impact water quality (and water quality standards set by the State of Utah and the U.S. Environmental Protection Agency [EPA]) and protection of dependent resources?
- How would proposed vegetation management and land use allocations affect noxious and invasive, nonnative plants?
- How would proposed management impact historic properties?
- How would proposed management protect cultural resources, including cultural landscapes, traditional uses, and historic properties?
- How would proposed management ensure continued traditional uses of religious or cultural sites important to Tribal Nations and local communities?
- How would proposed management impact landscapes of religious or cultural importance to Tribal Nations and local communities?

- How would proposed management decisions regarding paleontological resource management (such as curation, protection, survey, collection, outreach, and interpretation) impact paleontological resources, research communities, local communities, and visitor experiences?
- How would land use allocations and discretionary uses impact paleontological resources?
- How would land use allocations and discretionary uses impact unique geological features?
- How would proposed management affect wildlife, fisheries, and special status species resources?
- How would proposed management affect inventoried visual values, including scenic quality, and the public's highly valued experience of enjoying scenery?
- How would proposed management actions affect dark night skies?
- How would proposed management affect natural quiet soundscapes?
- How would land use allocations and discretionary uses affect fire and fuels?
- How would vegetation management actions affect fire and fuels?
- How would proposed management affect the size; apparent naturalness; outstanding opportunities for solitude or primitive, unconfined recreation; and supplemental values of lands with wilderness characteristics?
- How would vegetation management decisions affect woodland and forestry product harvest in the planning area?
- How would proposed management impact livestock grazing and ranching operations under existing permits and leases?
- How would proposed management affect rangeland condition?
- How would proposed management affect the BLM's ability to provide recreational opportunities and infrastructure while protecting GSENM objects of historical and scientific interest?
- How would proposed management affect the travel and transportation system in GSENM?
- How would proposed management affect land use authorizations and land tenure in the decision area?
- How would management affect the relevant and important values of potential areas of critical environmental concern (ACECs)?
- How would management affect the nature and purpose of the Old Spanish National Historic Trail (OSNHT)?
- How would management impact the viewshed surrounding scenic routes and the experience of enjoying scenic routes within the planning area?
- How would management impact the cultural, historic, and natural resources for which National Heritage Areas were designated?
- How would management affect the free-flowing condition, water quality, outstandingly remarkable values (ORVs), and tentative classification of river segments found suitable for inclusion in the National Wild and Scenic Rivers System?
- How would management actions affect the nonimpairment standard in of Wilderness Study Areas (WSAs)?
- How would BLM management actions impact local and regional economic interests and conditions?
- How would BLM management actions impact social conditions and values of communities?

- How would BLM management actions impact the environment, health, and livelihoods of communities with environmental justice concerns?

I.4.2 Issues Considered but Not Analyzed Further

The following issues were considered but are not being analyzed further for the reasons outlined:

- How would proposed management affect valid existing rights for minerals in the decision area? Proclamation 10286 appropriated and withdrew GSENM “from all forms of entry, location, selection, sale, or other disposition under the public land laws, from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing... subject to valid existing rights.” As a result, GSENM is closed to new oil and gas, geothermal, coal, and nonenergy solid minerals leasing and closed to new location of mining claims under the Mining Law of 1872. GSENM is also closed to mineral materials disposal (such as sand, gravel, and petrified wood) under 30 USC 601. Under the 2020 Approved RMP for the Kanab-Escalante Planning Area (KEPA), lands in the former KEPA were available for such uses, with stipulations or restrictions in areas to protect certain resources. Proclamation 10286 removed the discretion from the BLM Authorized Officer to make decisions related to these uses. As a result, the alternatives would not measurably impact mineral exploration and development within GSENM. In accordance with Proclamation 10286, the BLM will continue to recognize valid existing rights.
- How would proposed management affect public health and safety around abandoned mines in the decision area? The BLM typically closes abandoned mines as they are identified and as funding allows under the Abandoned Mine Lands Program. Proposed management would not measurably change public health and safety concerns related to abandoned mines in GSENM.
- How would proposed management affect land tenure in the decision area? Proclamation 10286 withdraws all BLM-managed land within GSENM from selection, sale, or other disposition under the public land laws, other than by exchange that furthers the protective purposes of GSENM. As such, the BLM has limited discretion over disposal. The BLM would acquire land only from willing sellers as opportunities arise. Therefore, the alternatives would not measurably impact land tenure in GSENM.
- How would proposed management impact wild horses? No wild horses are in the Moody-Wagon Box Mesa herd area, so there would be no impacts on wild horses in that location. Management related to wild horses would be the same across all alternatives, including Alternative A. A small number of wild horses remain in the Harvey’s Fear herd area (less than 25 as of 2016). However, due to its remote location, the herd does not have contact with other horses and is becoming genetically unviable. Proposed management is not directed at the herd area, and it would not impact the herd area, primarily due to the herd area’s remote location and dwindling population. See Section 5.21 of the Analysis of the Management Situation (AMS; <https://eplanning.blm.gov/eplanning-ui/project/2020343/570>) for more information on wild horses in GSENM.

I.5 REGULATORY CONTEXT

The foundations of public land management are in the mandates and authorities provided in laws and regulations. Executive orders; BLM instruction memoranda, information bulletins, manuals, and handbooks; and other policy and guiding direction implement and interpret the authorities provided under

those laws and regulations. These sources of federal policy direct the BLM concerning management of public lands and resources. The BLM’s planning process, as described in 43 CFR Part 1600, is authorized and mandated through two important laws, FLPMA and NEPA.

The FLPMA states the policy of the United States concerning the management of federally owned land managed by the BLM. As discussed in Section 1.1 of this RMP, FLPMA provides that the BLM “shall manage the public lands under principles of multiple use and sustained yield ... except that where a tract of such public land has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law” (43 USC 1732(a)). Proclamation 10286 dedicates GSENM to specific uses. Additionally, GSENM is a component of the NLCS; therefore, the BLM is required to manage GSENM “in a manner that protects the values for which the components of the system were designated” (16 USC 7202). Accordingly, discretionary uses in GSENM must be consistent with Proclamation 10286, 16 USC 7202, and the BLM’s approved land use plan.

In NEPA, Congress directs “all agencies of the Federal Government...[to]...utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man’s environment” (42 USC 4332(A)). This EIS and RMP examine a range of alternatives, including Alternative A, to resolve the issues in question. Alternatives represent complete but different means of satisfying the identified purposes and needs of the EIS and of resolving the issues. The RMP/EIS uses the best available information. Other federal laws, regulations, and policies, as well as applicable state, local, and other applicable regulatory frameworks, are identified below.

The BLM develops land use plans through a planning and NEPA process that includes public involvement (43 USC 1712(a)). The FLPMA also directs the BLM to coordinate with other federal departments and agencies, state and local governments, and Tribal Nations to seek to promote consistency among land use plans across jurisdictions. The BLM has coordinated and collaborated with such entities throughout the RMP/EIS process.

Chapter 3 of the AMS (<https://eplanning.blm.gov/eplanning-ui/project/2020343/570>) includes a list of relevant federal laws, as well as BLM plans, policies, and programs. Additional relevant laws, regulations, and policies are included below.

1.5.1 Relationship to BLM Regulations, Policies, and Plans

The GSENM RMP will replace the 2020 GSENM RMPs and the 2020 KEPA RMP. It will also obviate the Interim Guidance issued on December 16, 2021, which informed BLM staff of how Proclamation 10286 fit into the existing legal framework that governs GSENM until the BLM completes a new management plan for GSENM.

1.5.2 Other Federal, State, and Local Government, and Tribal Resource-Related Plans

Federal Plans

In general, these plans relate to this planning effort due to the proximity of the area managed in the plan and GSENM.

- Glen Canyon National Recreation Area Grazing Management Plan—Identifies goals and objectives for the natural and cultural resources with respect to livestock grazing in Glen Canyon.

- Bryce Canyon National Park Air Tour Management Plan—Protects tangible and intangible resources of Bryce Canyon, including natural sounds, wildlife, wilderness character, and visitor experiences of solitude and quiet as visitors are allowed reasonable opportunities to experience these landscapes from the air.
- Capitol Reef National Park General Management Plan—Directs natural and cultural resource management, visitor use, and general development.
- Capitol Reef National Park Livestock Grazing and Trailing Management Plan—Promotes the shared conservation and stewardship of the natural resources, ecological processes, and cultural resources of Capitol Reef National Park by providing guidance and tools to the NPS and permit holders for the long-term management of livestock grazing and trailing at the park.
- Bryce Canyon National Park International Dark Sky Park Application—Designates Bryce Canyon National Park as a Gold Tier International Dark Sky Park under the 2015 International Dark Sky Association Guidelines.
- Glen Canyon National Recreation Area Management Plan—Directs natural and cultural resource management, visitor use, and general development.
- Rainbow Bridge National Monument Commercial Air Tour Voluntary Agreement—Establishes conditions for commercial air tours over Rainbow Bridge National Monument.

State Plans

Relevant State of Utah regulations germane to the planning process can be found in Chapter 3 of the AMS (<https://eplanning.blm.gov/eplanning-ui/project/2020343/570>), with the following additions

- Utah Mule Deer Statewide Management Plan for 2019–2024
- Utah Division of Wildlife Resources (UDWR) Statewide Bighorn Management Plan 2018
- Implementation of Secretarial Order 3362 Utah Action Plan 2022
- Bighorn Sheep Unit Management Plan Kaiparowits Wildlife Management Unit #26 East/West/Escalante, August 2019
- Deer Herd Unit Management Plan #27 Paunsaugunt, 2020
- Utah Statewide Elk Management Plan, 2022
- Elk Management Plan – Greater Plateau Elk Complex – Elk units: 23 Monroe, and 24 Mt. Dutton, 25 A&B, Fish Lake/Thousand Lakes, 25C Boulder/Kaiparowits
- Utah Pronghorn Statewide Management Plan, 2017
- Utah Black Bear Management Plan 2023–2035
- Wild Turkey Management Plan 2014–2023

County Plans

The planning area encompasses approximately 1,880,400 acres in portions of Kane and Garfield Counties. County plans, policies, and programs that may be germane to the planning effort process can be found in Chapter 3 of the AMS (<https://eplanning.blm.gov/eplanning-ui/project/2020343/570>).

Tribal Plans

No tribal plans have been identified.

I.6 CONSISTENCY WITH LOCAL LAND USE PLANS

The FLPMA, Title II, Section 202, provides guidance for the land use planning system of the BLM to coordinate planning efforts with Native American Indian tribes, other federal departments, and agencies of the state and local governments. To accomplish this directive, the BLM is directed to keep apprised of state, local, and tribal plans; assure that consideration is given to such plans; and assist in resolving inconsistencies between such plans and federal planning. The section goes on to state in Subsection (c)(9) that, “Land use plans of the Secretary [of the Interior] under this section shall be consistent with state and local plans to the maximum extent he finds consistent with federal law and the purposes of this Act.” The provisions of this section of FLPMA are echoed in Section 1610.3 of the BLM Resource Management Planning regulations.

In keeping with the provisions of this section, the BLM established regular opportunities for interaction with state, local, and tribal officials. State, county, and municipal officials have participated in regular informational meetings. Further coordination with the counties and state included multiple coordination meetings.

According to Section 1610.4-7 of the BLM Resource Management Planning regulations, the Draft RMP/EIS is provided to the Governor, other federal agencies, state and local governments, and Native American tribes for comment. The resulting comments will be addressed in the proposed RMP/EIS. The formal 60-day consistency review by the Governor will occur after the proposed RMP/EIS is published, as outlined in 1610.3-2(e) of the BLM planning regulations.

I.7 REFERENCES

BLM GIS (United States Department of the Interior, Bureau of Land Management geographic information system). 2022. GIS data used in the GSENM alternatives, affected environment, and impact analysis. Kanab, Utah. Last edited May 10, 2023.

Congress.gov. 2008. Text – H.R.2016 – 110th Congress (2007-2008): National Landscape Conservation System Act. April 10, 2008. Internet website: <https://www.congress.gov/bill/110th-congress/house-bill/2016/text>.

Chapter 2. Alternatives

This chapter details Alternatives A through D for the GSENM Draft RMP/EIS and includes references to maps (**Appendix A**) identifying where allocations would apply. The BLM formulated the alternatives in response to issues and concerns identified through public and internal scoping, to resolve deficiencies with current management strategies, and to explore opportunities for enhanced management of resources and resource uses. A **glossary** that provides definitions of terms can be found following the **references** section of this EIS.

2.1 SUMMARY DESCRIPTION OF THE ALTERNATIVES

RMP decisions consist of identifying and clearly defining goals and objectives (desired outcomes) for resources and resource uses, followed by developing allocations for allowable resource uses (allocations) and management direction necessary for achieving the goals and objectives. These critical determinations guide future land management and subsequent site-specific implementation actions to meet the GSENM's purposes.

Each alternative must respond to the issues identified during scoping, seek to resolve conflicts among resources and resource uses, meet the purpose of and need for the RMP, and be feasible to implement. After considering the issues and the purpose and need, the BLM developed three alternatives to analyze in detail, in addition to Alternative A (current management).

Each alternative contains a set of objectives and management directions constituting a distinct possible RMP. Resource program goals are met in varying degrees with the potential for different long-range outcomes and conditions. The relative emphasis given to particular resources and resource uses also differs, including allocations, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives.

Quantifiable differences among the alternatives are described in **Table 2-1** (Quantifiable Summary of the Alternatives). **Section 2.4** (Detailed Description of the Alternatives) provides a complete description of proposed decisions for each alternative, including goals, objectives, management direction, and allocations for individual resource programs. Maps in **Appendix A** provide a visual representation of geographic management differences between alternatives.

The BLM used GIS data to perform acreage calculations and to generate the maps in **Appendix A**. Calculations depend on the quality and availability of data. Most calculations in this RMP are rounded to the nearest 100 acres or 1 mile. Given the scale of the analysis, the compatibility constraints between data sets, and the lack of data for some resources, all calculations are approximate; they serve for comparison and analytic purposes only. Likewise, the maps in **Appendix A** are provided for illustrative purposes and are subject to the limitations discussed above. The BLM may receive additional or updated data; therefore, acreages may be recalculated and revised at a later date.

Table 2-1. Quantifiable Summary of the Alternatives

Resource, Resource Use, or Special Designation	Alternative A	Alternative B	Alternative C	Alternative D
Management Areas (acres)			Figure 2-1	
Front County	N/A	N/A	37,700	N/A
Passage	N/A	N/A	51,700	N/A
Outback	N/A	N/A	669,200	N/A
Primitive	N/A	N/A	1,122,500	N/A
Visual Resource Management (VRM) (acres)	Figure 2-2	Figure 2-3	Figure 2-4	Figure 2-5
VRM Class I	881,100	955,000	1,072,500	1,440,700
VRM Class II	422,300	558,800	645,400	424,900
VRM Class III	346,500	351,800	147,700	0
VRM Class IV	215,700	0	0	0
Lands with Wilderness Characteristics (acres)	Figure 2-6	Figure 2-7	Figure 2-8	Figure 2-9
Management Strategy 1 (protect)	0	72,000	190,100	559,600
Management Strategy 2 (minimize)	0	0	366,900	0
Management Strategy 3 (not protect)	559,600	487,600	2,600	0
Total	559,600	559,600	559,600	559,600
Forestry and Woodland Products (acres)	Figure 2-10	Figure 2-11	Figure 2-12	Figure 2-13
Allow for noncommercial harvest of forestry and woodland products	984,500	906,300	88,000	0
Prohibit noncommercial harvest of forestry and woodland products	881,100	959,300	1,777,600	1,865,600
Total	1,865,300	1,865,300	1,865,300	1,865,300
Livestock Grazing (acres)	Figure 2-14	Figure 2-15	Figure 2-16	Figure 2-17
Available for livestock grazing	2,116,200	2,037,300	1,927,000	1,150,000
Unavailable for livestock grazing	125,800	204,700	315,000	1,092,000
Total	2,242,000	2,242,000	2,242,000	2,242,000
Recreation (Extensive Recreation Management Areas [ERMAs]) (acres)	Figure 2-18	Figure 2-19	Figure 2-20	Figure 2-21
GSENM	989,300	N/A	N/A	N/A
Cottonwood Road Recreation Management Zone (RMZ) (GSENM)	2,200	N/A	N/A	N/A
KEPA	808,400	N/A	N/A	N/A
Little Desert RMZ	2,500	N/A	N/A	N/A
Cottonwood Road RMZ (KEPA)	3,100	N/A	N/A	N/A
Fiftymile Mountain	N/A	N/A	40,900	N/A

Resource, Resource Use, or Special Designation	Alternative A	Alternative B	Alternative C	Alternative D
Buckskin – Five Mile	N/A	129,500	59,600	N/A
Circle Cliffs-Wolverine	N/A	93,300	93,300	N/A
Egypt	N/A	N/A	N/A	14,100
Escalante Desert	N/A	204,300	119,800	N/A
Kaiparowits Plateau	N/A	872,900	N/A	N/A
Little Desert	N/A	2,400	N/A	2,400
Nephi Pasture	N/A	N/A	78,800	N/A
North Escalante Canyons	N/A	113,400	N/A	113,400
Paria-Hackberry Canyons	N/A	137,500	N/A	121,300
Skutumpah Terrace – Deer Range	N/A	216,800	70,500	N/A
Smoky Mountain – Left Hand Collett Roads Corridors	N/A	N/A	11,000	N/A
Wahweap Hoodoos – White Rocks	N/A	N/A	12,400	N/A
Total	1,797,700	1,770,100	486,300	251,200
Recreation (Special Recreation Management Areas [SRMAs]) (acres)	Figure 2-18	Figure 2-19	Figure 2-20	Figure 2-21
Burr Trail Road	5,800	5,200	5,200	5,200
Deer Creek RMZ	600	N/A	N/A	N/A
The Gulch RMZ	100	N/A	N/A	N/A
Calf Creek	7,000	N/A	N/A	N/A
Cottonwood Canyon Road	N/A	16,100	16,100	16,100
Egypt	N/A	N/A	14,100	N/A
Highway 12 – Escalante to Boulder	N/A	22,500	22,500	3,100
Lower Calf Creek RMZ	N/A	400	N/A	N/A
Upper Calf Creek Watershed RMZ	N/A	2,400	N/A	N/A
Upper Calf Creek Falls RMZ	N/A	500	N/A	N/A
Highway 89	N/A	10,500	N/A	N/A
Hole-in-the-Rock Road	23,300	N/A	10,300	10,300
Dance Hall Rock RMZ	600	N/A	N/A	N/A
Dry Fork Wash RMZ	1,200	N/A	N/A	N/A
Devil's Garden RMZ	600	N/A	N/A	N/A
20-Mile Dinosaur Tracks RMZ	300	N/A	N/A	N/A
Egypt Slot Canyons RMZ	6,200	N/A	N/A	N/A
House Rock Valley Road	N/A	1,200	1,600	1,600
Little Desert	N/A	N/A	2,400	N/A
North Escalante Canyons	N/A	N/A	113,400	N/A
Old Paria	N/A	N/A	1,200	1,200
Paria Canyons Vermillion Cliffs	30,000	N/A	N/A	N/A
Paria-Hackberry Canyons	N/A	N/A	121,300	N/A
Phipps Death Hollow	N/A	39,800	39,800	53,100
Skutumpah Road	1,500	N/A	N/A	N/A
Skutumpah Corridor	N/A	N/A	5,300	5,300

Resource, Resource Use, or Special Designation	Alternative A	Alternative B	Alternative C	Alternative D
Spencer Flats – Red Breaks	N/A	N/A	59,800	60,700
Toadstools	N/A	N/A	4,400	4,400
Total	67,600	95,300	417,400	161,000
Recreational Target Shooting (acres)	Figure 2-22	Figure 2-23	Figure 2-24	Figure 2-25
Closed	8,800	973,100	1,215,100	1,865,600
Open	1,856,800	892,500	650,500	0
Travel and Transportation Management (acres)	Figure 2-26	Figure 2-27	Figure 2-28	Figure 2-29
Closed to off-highway vehicle (OHV) use	2,800	953,100	1,209,900	1,638,800
OHV travel limited to designated routes	1,862,700	912,500	655,700	226,800
Open OHV use	100	0	0	0
Rights-of-Way (ROWs) (acres)	Figure 2-30	Figure 2-31	Figure 2-32	Figure 2-33
ROW exclusion area	881,300	976,400	1,188,600	1,693,700
ROW avoidance area	332,800	790,800	646,600	150,100
Open to ROW authorization	630,400	85,100	10,900	2,300
ROW seasonal avoidance area	21,100	13,300	19,500	19,500
Designated Corridors (acres)	Figure 2-34	Figure 2-34	Figure 2-34	Figure 2-35
Section 368 Corridor 68-116	8,600	8,600	8,600	N/A
Highway 89	2,800	2,800	2,800	2,800
Total	11,400	11,400	11,400	2,800
ACECs and Research Natural Areas (RNAs) (acres)	Figure 2-36	Figure 2-37	Figure 2-38	Figure 2-36
Warm Creek ACEC	N/A	10,800	N/A	N/A
Willis Creek ACEC	N/A	22,200	N/A	N/A
No Mans Mesa RNA (ACEC)	2,800	2,800	2,800	2,800
Little No Mans Mesa RNA (ACEC)	N/A	50	50	N/A
Little Spring Point RNA (ACEC)	N/A	30	30	N/A
Fiftymile Mountain RNA (ACEC)	N/A	54,800	54,800	N/A
Total	2,800	90,680	57,680	2,800
Wild and Scenic Rivers (WSRs)				
Suitable River Segments (miles¹)	Figure 2-39	Figure 2-40	Figure 2-40	Figure 2-40
<i>Escalante River System</i>				
Escalante River #1	13.7	13.7	13.7	13.7

¹ Mileage for WSRs for all alternatives are identical.

Resource, Resource Use, or Special Designation	Alternative A	Alternative B	Alternative C	Alternative D
Escalante River #2	0.3	0.3	0.3	0.3
Escalante River #3	19.2	19.2	19.2	19.2
Harris Wash	1.1	1.1	1.1	1.1
Lower Boulder Creek	13.5	13.5	13.5	13.5
Slickrock Canyon	2.8	2.8	2.8	2.8
Lower Deer Creek #1	2.0	2.0	2.0	2.0
Lower Deer Creek #2	7.0	7.0	7.0	7.0
The Gulch #1	11.0	11.0	11.0	11.0
The Gulch #2	0.6	0.6	0.6	0.6
The Gulch #3	13.0	13.0	13.0	13.0
Steep Creek	6.4	6.4	6.4	6.4
Lower Sand Creek	10.6	10.6	10.6	10.6
Willow Patch Creek	2.6	2.6	2.6	2.6
Mamie Creek and West Tributary	9.2	9.2	9.2	9.2
Death Hollow Creek	9.9	9.9	9.9	9.9
Calf Creek #1	3.5	3.5	3.5	3.5
Calf Creek #2	3.0	3.0	3.0	3.0
Calf Creek #3	1.5	1.5	1.5	1.5
Twenty-five-mile Wash	6.8	6.8	6.8	6.8
<i>Paria River System</i>				
Upper Paria River #1	21.7	21.7	21.7	21.7
Upper Paria River #2	14.4	14.4	14.4	14.4
Lower Paria River #1	3.3	3.3	3.3	3.3
Deer Creek Canyon	5.2	5.2	5.2	5.2
Snake Creek	4.7	4.7	4.7	4.7
Hogeye Creek	6.3	6.3	6.3	6.3
Kitchen Canyon	1.3	1.3	1.3	1.3
Starlight Canyon	4.9	4.9	4.9	4.9
Lower Sheep Creek	1.5	1.5	1.5	1.5
Hackberry Creek	20.1	20.1	20.1	20.1
Lower Cottonwood Creek	1.6	1.6	1.6	1.6
Total	224.2	224.2	224.2	224.2
Eligible River Segments (miles¹)	Figure 2-39	Figure 2-40	Figure 2-40	Figure 2-40
Scorpion Gulch	0.8	0.8	0.8	0.8
Fools Canyon	<0.0	<0.0	<0.0	<0.0
Coyote Gulch	0.7	0.7	0.7	0.7
Total	1.5	1.5	1.5	1.5
Wilderness Study Areas (WSAs) (acres²)	Figure 2-41	Figure 2-41	Figure 2-41	Figure 2-41
Phipps-Death Hollow	42,731	42,731	42,731	42,731
Steep Creek	21,896	21,896	21,896	21,896
North Escalante Canyons/The Gulch	119,752	119,752	119,752	119,752
Carcass Canyon	46,711	46,711	46,711	46,711
Scorpion	35,884	35,884	35,884	35,884
Escalante Canyons Tract I	360	360	360	360
Escalante Canyons Tract 5	760	760	760	760

² Acreage for WSAs for all alternatives are identical.

Resource, Resource Use, or Special Designation	Alternative A	Alternative B	Alternative C	Alternative D
Devil Garden	640	640	640	640
The Blues	19,030	19,030	19,030	19,030
Fiftymile Mountain	146,143	146,143	146,143	146,143
Death Ridge	62,870	62,870	62,870	62,870
Burning Hills	61,550	61,550	61,550	61,550
Mud Spring Canyon	38,075	38,075	38,075	38,075
The Cockscomb	10,080	10,080	10,080	10,080
Paria/Hackberry and Paria Hackberry 202	135,822	135,822	135,822	135,822
Wahweap	134,400	134,400	134,400	134,400
Total	876,704	876,704	876,704	876,704

Source: BLM GIS 2022

2.1.1 Alternative A

Alternative A represents current management from the 2020 GSENM Approved RMPs, which apply to the lands in GSENM as they existed under Proclamation 9682, and the 2020 KEPA Approved RMP, which applies to the lands that were excluded from GSENM under Proclamation 9682, to the extent that those management actions are consistent with Proclamation 10286. In some cases, decisions in the 2020 Approved RMPs are inconsistent with Proclamation 10286; in those instances, Alternative A has been modified to comply with Proclamation 10286.

Alternative A generally allows for maximum discretionary uses (for example, ROWs and livestock grazing) and emphasizes management flexibility while still providing for resource protection as required by applicable regulations, laws, policies, plans, and guidance, including the proper care and management of GSENM objects. Alternative A includes the following:

- **Recreation Management Areas (RMAs):** There are five SRMAs, two ERMAs, and seven RMZs. These RMAs would cover the entirety of GSENM.
- **OHV Use:** OHV use would be limited to designated routes, except in No Mans Mesa RNA (ACEC), which would be closed to OHV use, and the Little Desert RMZ in the former KEPA, which would be open to cross-country OHV use.
- **Target Shooting:** Target shooting would be prohibited within 0.25 miles of residences, campgrounds, and developed recreational facilities. The distance may be increased depending on area-specific conditions.
- **Recreational Facilities:** The 2020 Approved RMPs do not expressly discuss recreational facilities. However, there are few expressed restrictions outside WSAs on where development could occur.
- **Livestock Grazing:** Nearly all allotments are available for livestock grazing. All suspended AUMs could be activated over time, pending subsequent analysis and decisions. The 2020 Approved RMPs allow the creation of new nonstructural range improvements where they are not otherwise restricted by another designation. Existing seedings would be restored using a mix of native and nonnative species.
- **ACECs and RNAs (ACECs):** Under this alternative, management of the previously designated No Mans Mesa RNA (ACEC) would continue. No new ACECs would be designated.

- **Vegetation Management:** The BLM could use the full range of vegetation management methods and tools (such as prescribed fire; mechanical, chemical, and biological treatments; and woodland product removal). Treatments would be prioritized in areas where removal of woodland products would improve rangeland health, wildlife habitat, and forage. Nonnative species would be allowed, where necessary, to optimize land health, forage, and productivity in nonstructural range improvements.
- **Other Discretionary Actions:** Besides WSAs, which are exclusion areas, all lands would be either avoidance areas or open for ROWs, permits, and leases, as allowed by Proclamation 10286. The suitability for these land and realty actions would be assessed on a case-by-case basis. Alternative A also would prohibit the casual collection of all paleontological resources, mineral resources, and petrified wood to the extent that prohibition does not constitute a substantial burden on the exercise of religion under the Religious Freedom Restoration Act and other applicable laws.
- **Lands with Wilderness Characteristics:** Lands with wilderness characteristics would not receive any special management to protect size, naturalness, and opportunities for solitude, or primitive and unconfined types of recreation.
- **Transportation and Access:** Maintenance will be performed in accordance with the 2000 Monument Management Plan (MMP) until new travel management plans (TMPs) are completed.

2.1.2 Alternative B

Alternative B emphasizes flexibility in planning-level direction to maximize the potential for an array of discretionary actions that may be compatible with the protection of GSENM objects. Alternative B includes the following:

- **RMA:** Five SRMAs and three RMZs would be established to provide for specific outcomes-based recreational experiences as identified in recreational setting characteristics. Those desired recreation setting characteristics help produce the recreation activity that, in turn, facilitates the outcomes identified in the SRMA objective. Additionally, nine ERMAs would be designated. These RMAs would cover the entirety of GSENM.
- **OHV Use:** WSAs/instant study areas (ISAs), lands with wilderness characteristics identified for protection, and No Mans Mesa RNA (ACEC) would be closed to OHV use. The remainder of GSENM would limit OHV travel to designated routes, with some road density and siting criteria identified. No areas would be open to OHV use.
- **Target Shooting:** Recreational target shooting would be prohibited within 0.25 miles of residences, from, on, or across highways, campgrounds, and developed recreation facilities. RNAs (ACECs) and WSAs/ISAs would be closed to target shooting.
- **Recreational Facilities:** To provide for public health and safety, recreational facilities, such as designated campgrounds and bathrooms, may be developed at some locations. Recreational facilities would be allowed in accordance with RMA prescriptions.
- **Livestock Grazing:** Allotments that are not under permit would be made unavailable for livestock grazing. Allocated AUMs would be the total permitted use of available allotments. Land health assessments would be required within 2 years of the signing of the record of decision (ROD) on allotments within watersheds that have shown a high degree of departure from reference conditions (henceforth, departed watershed). These eight watersheds (see **Figure 3-24, Departed Watersheds, Appendix A**) were identified using data and methods determined by BLM

Utah State Office relating to water, soils and vegetation resources. Further analysis is discussed in **Appendix B**. Changes in grazing practices would be made according to the results of the land health assessments and determinations. New range improvements could be allowed if they are consistent with the protection of GSENM objects. The BLM would prohibit nonstructural range improvements with a primary purpose of increasing forage for livestock. Maintenance of existing structural range improvements would be allowed if both the structural range improvement and maintenance are consistent with the protection of GSENM objects.

- **ACECs and RNAs (ACECs):** The BLM would designate two ACECs and four RNAs (ACECs). The purpose of these designations would be to protect intact ecosystems where special management—beyond the typical protections provided in GSENM—would be required to protect GSENM objects.
- **Vegetation Management:** Landscape-scale restoration projects would be used to restore functional and resilient vegetation communities. For all vegetation management efforts, potential for lasting resilient restoration would be maximized through the preferential use of native vegetation. Nonnative vegetation may be used in restoration efforts when consistent with project and site-specific consideration and rationale. New discretionary actions would be avoided within 330 feet of riparian areas, unless the action would improve riparian health and result in no adverse impacts on wetlands and riparian areas.
- **Other Discretionary Actions:** Alternative B would accommodate other discretionary actions, such as ROW authorizations. Areas closed to ROW authorizations would include lands with wilderness characteristics, RNAs (ACECs), ACECs, WSAs, the OSNHT, and suitable wild segments of wild and scenic rivers (VSRs). All other lands would be either avoidance areas or open for ROWs, permits, and leases. To ensure discretionary uses are consistent with the protection of GSENM objects, the BLM would evaluate proposed actions on a project-by-project basis.
- **Lands with Wilderness Characteristics:** The BLM would manage some lands with wilderness characteristics to protect those characteristics (that is, size, naturalness, and opportunities for solitude or primitive and unconfined recreation). Therefore, the BLM would eliminate or limit compatible uses in these areas; others would be managed for other compatible uses while not protecting wilderness characteristics.
- **Transportation and Access:** Routes could be maintained and improved to meet public health and safety needs and/or to protect GSENM objects.

2.1.3 Alternative C

Alternative C emphasizes the protection and maintenance of intact and resilient landscapes using an area management approach to selectively allow for discretionary uses in appropriate settings. Four management areas similar to those used in the 2000 MMP would be established: the front country area, passage area, outback area, and primitive area. The designation of management areas would serve as the primary tool for allowable uses while also protecting GSENM objects. Area descriptions under Alternative C include the following:

- **Front Country Area** – The front country area is the focal point for visitation and provides day-use and overnight opportunities that are supported by developed infrastructure. Educating visitors about GSENM objects and resources and their historic and scientific importance will be emphasized. The front country area allows for visitor centers and contact stations, primary day

use and interpretation sites, highway waysides and overlooks, developed trails and trailheads, and developed campgrounds. The facilities in this area could accommodate larger groups.

- **Passage Area** – The passage area is the secondary area for visitation and provides day use and overnight opportunities that are less developed than those found in the front country area. The passage area allows for secondary travel routes that are a mix of paved and unpaved roads, which receive use as throughways and scenic driving routes and provide access to recreation destinations. It also provides access to outback and primitive day use and overnight opportunities. The passage area is intended to provide basic recreational infrastructure to support a range of recreational activities and allow visitors to learn about GSENM objects and resources. This basic infrastructure includes and could include additional trailheads, day use and picnic sites, small campgrounds and designated camping areas, toilets, interpretive sites, waysides, and overlooks.
- **Outback Area** – The outback area provides a self-directed visitor experience while accommodating motorized and mechanized access on designated routes. Facilities will be rare and provided only when essential for resource protection or public safety.
- **Primitive Area**– The primitive area provides an undeveloped, primitive, and self-directed visitor experience without motorized or mechanized recreational access. Facilities will be nonexistent, except for limited signs for resource protection or public safety.

Additional descriptions of Alternative C include the following:

- **RMAs:** Fourteen SRMAs would be designated to provide for specific outcomes-based recreational experiences as identified in recreation setting characteristics. Those desired recreation setting characteristics help produce the recreation activity that, in turn, facilitates the outcomes identified in the SRMA objective. The BLM also would designate eight ERMAs to manage for specific recreational outcomes while ensuring resource protection. These RMAs would not cover all lands within GSENM.
- **OHV Use:** The primitive area and areas, such as No Mans Mesa, WSAs/ISAs, and some lands with wilderness characteristics, would be closed to OHV use; the remainder of GSENM (front country, passage, and outback areas) would limit OHV travel to designated routes. In OHV-limited areas, road density would be minimized. Siting criteria would be identified, especially in important resource areas, to ensure the protection of GSENM objects. No areas would be designated as open to OHV use.
- **Target Shooting:** Recreational target shooting would be prohibited in the front country and primitive areas. In the passage and outback areas, target shooting would be prohibited within 0.25 miles of residences, campgrounds, and developed recreation facilities.
- **Recreational Facilities:** Management areas would identify areas in which recreational facilities could be developed to meet future recreational needs. In general, the front country would allow for facilities to accommodate larger groups, while facilities would be nonexistent in the primitive area.
- **Livestock Grazing:** Allotments that are not under permit would be made unavailable for livestock grazing. Allotments that are both in GSENM and Glen Canyon, and the pastures and allotments fully within Glen Canyon would be closed to livestock grazing. Allocated AUMs would be the total permitted use of available allotments. Land health assessments would be required within 2 years of the RMP/EIS ROD on allotments within departed watersheds. Changes in grazing practices would be made according to the results of the land health assessments and determinations. No new structural range improvements would be permitted unless a current (within the last 10 years)

land health assessment and determination are completed for the allotment, unless the improvement would exclude livestock from an area and/or provide protection of GSENM objects. The BLM would prohibit nonstructural range improvements with a primary purpose of increasing forage for livestock.

- ACECs and RNAs (ACECs): Under this alternative, the BLM would designate four RNAs (ACECs).
- Vegetation Management: For all vegetation management efforts, maximize potential for lasting resilient restoration through the preferential use of native vegetation. Nonnative vegetation may be used in restoration efforts as consistent with project and site-specific consideration and rationale. To best support recovery of site integrity and resilience, use adaptive management to ensure that health of these efforts is maintained. The front country and passage areas would focus on proactive management, while the outback and primitive areas would focus on natural processes. New discretionary actions would be avoided within 330 feet of riparian areas in all areas. In the front country, passage, and outback areas, the action must not result in adverse impacts on wetland and riparian areas. In the primitive area, the action must enhance the riparian area.
- Other Discretionary Actions: Alternative C would prohibit soil-disturbing actions in the outback and primitive areas to protect and restore soil health, which is foundational for healthy ecosystems. Areas closed to ROW authorizations would include lands with wilderness characteristics, RNAs (ACECs), WSAs, the OSNHT, and suitable wild WSR segments (that are within the outback and primitive areas), and the primitive area. All other lands would be either avoidance areas or open for ROWs, permits, and leases. The BLM would authorize access ROWs to private inholdings, if required by law or regulation.
- Lands with Wilderness Characteristics: All lands with wilderness characteristics in the primitive area would be managed to protect those characteristics (that is, size, naturalness, and opportunities for solitude or primitive and unconfined recreation) while providing for compatible uses. The BLM would manage all lands with wilderness characteristics in the passage and outback areas to minimize impacts on wilderness characteristics while allowing for compatible uses. Only lands with wilderness characteristics in the front country area would be managed for other compatible uses while not protecting wilderness characteristics.
- Transportation and Access: Routes could be maintained and improved to meet public health and safety needs and to protect GSENM objects.

2.1.4 Alternative D

Alternative D strives to maximize natural processes by minimizing active management and limiting discretionary uses. Land use allocations would curtail discretionary uses, including recreation, livestock grazing, ROWs, and activities under special recreation permits (SRPs). This alternative would also constrain management actions to emphasize natural conditions, such as passive vegetation management. Alternative D includes the following:

- RMAs: The BLM would designate 10 SRMAs and four ERMAs under this alternative. These RMAs would not cover all lands within GSENM. This alternative would designate the least amount of acres within RMAs.
- OHV Use: This alternative would designate more lands as closed to OHV use than any other alternative. Designated road density would be minimized, and siting criteria would be identified to ensure the protection of GSENM objects. No areas would be open to OHV use.

- **Target Shooting:** Recreational target shooting would not be allowed anywhere within the boundaries of GSENM.
- **Recreational Facilities:** Recreational facilities would be allowed in accordance with RMA prescriptions. The BLM would prohibit new facilities in areas outside RMAs, except for signage.
- **Livestock Grazing:** Allotments that are not under permit would be made unavailable for livestock grazing. On allotments that are both in GSENM and Glen Canyon, the pastures and allotments fully within Glen Canyon would be closed to livestock grazing. Additionally, most allotments within departed watersheds would be closed. AUMs allocated to livestock would be based on current active use on lands available for grazing. For all allotments in GSENM, completed land health assessments and fully processed permit renewals would be required within 10 years of the signing of the ROD. No new structural range improvements would be permitted unless a current (within 10 years) land health assessment and determination are completed for the allotment, unless the improvement would exclude livestock from an area and/or provide protection of GSENM objects. Nonstructural range improvements with a primary purpose of increasing forage for livestock would be prohibited.
- **ACECs and RNAs (ACECs):** Under Alternative D, management of the previously designated No Mans Mesa RNA (ACEC) would continue. No new ACECs would be designated.
- **Vegetation Management:** Vegetation management methods would prioritize natural processes and techniques over other methods. New discretionary actions would be avoided within 330 feet of riparian areas unless the action would enhance riparian areas. Nonnative species could only be used with approval or for emergency actions.
- **Other Discretionary Actions:** The BLM would authorize access ROWs to private inholdings, if required by law or regulation. Under Alternative D, the BLM would manage the most acres of ROW exclusion. Under Alternative D, corridor 68-116 would no longer be designated as a 368 Energy Corridor under the Energy Policy Act of 2005, and the BLM would no longer focus placement of major ROWs in that corridor.
- **Lands with Wilderness Characteristics:** The BLM would manage all lands with wilderness characteristics to protect those characteristics (that is, size, naturalness, and opportunities for solitude or primitive and unconfined recreation) while providing for compatible uses.
- **Transportation and Access:** Routes could be maintained and improved to meet public health and safety needs.

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.2.1 Discontinue Livestock Grazing from the Entirety of GSENM

The BLM considered an alternative that would discontinue livestock grazing from GSENM; however, implementing a “no grazing” alternative would be considered remote and speculative. Grazing effects are often site-specific and not evenly distributed. Because of the diversity of ecotypes and large landscape of GSENM, grazing is potentially consistent with the protection of GSENM objects in certain portions of the monument. The BLM reviewed monitoring data and remote sensing data to better understand land health. The data identified departed watersheds, as previously described. In these departed watersheds, the BLM would consider discontinuing livestock grazing under Alternative D. However, the monitoring and remote sensing data did not suggest that grazing is incompatible with the protection of objects in all portions of GSENM, making it unlikely that the BLM would be able to justify selecting such an alternative. Therefore,

because implementation of a no-grazing is remote and speculative, a no-grazing alternative was not analyzed in detail.

Notably, under several alternatives, the BLM would prioritize the completion of land health assessments across GSENM within 10 years, which would inform permit renewals. Where a categorical exclusion cannot be used to fully process a grazing permit, a “no grazing” alternative would be considered in the NEPA document consistent with BLM Instruction Memorandum 2012-169. Analyzing a “no grazing” alternative within this EIS would involve broad landscape considerations of effects across the nearly 2 million acres of GSENM, whereas a site-specific analysis of “no grazing” during the permitting processes would provide a more specific understanding of grazing’s effects on allotments, land health, and GSENM’s objects.

2.2.2 Make the Entirety of GSENM Available for Livestock Grazing

The BLM considered an alternative that would make the entire GSENM available for livestock grazing. This alternative was eliminated from detailed analysis because it is substantially similar in design and would have substantially similar effects to Alternative A. Under Alternative A, the majority of GSENM is available for livestock grazing, with the exception two areas where grazing is either legally or physically prohibited: 1) the allotment that has been retired from livestock grazing as the result of a grazing permittee voluntarily relinquishing their permit, in accordance with Proclamation 10286; and 2) No Mans Mesa, a sky island that is generally inaccessible to livestock. With the exception of those two areas, Alternative A makes approximately 94.3 percent of GSENM available for livestock grazing. As such, analyzing an alternative that would allow grazing on the entirety of GSENM where it is not legally or physically prohibited would have substantially similar effects to Alternative A.

2.3 SELECTION OF THE PREFERRED ALTERNATIVE

The proposed alternatives offer a range of strategies for resolving deficiencies in existing management, exploring opportunities for enhanced management, and addressing issues identified through internal assessment and public scoping. Comments submitted by other government agencies, public organizations, state and tribal entities, and interested individuals were given careful consideration. At critical intervals during the alternative development process, cooperating agencies reviewed and provided comments on the proposed range of alternatives and the effects analysis.

The BLM land use planning regulations require the BLM to identify a preferred alternative in the draft RMP/EIS. The preferred alternative represents those goals, objectives, and management direction determined to be most effective at resolving planning issues and balancing resource uses and meeting the purpose and need. While collaboration is critical in developing and evaluating alternatives, the final identification of a preferred alternative remains the BLM’s exclusive responsibility.

The Paria River District Manager recommends Alternative C as the preferred alternative. The identification of the preferred alternative does not constitute a commitment or decision. It does not mean that the BLM will necessarily present the preferred alternative as the Proposed RMP in the Proposed RMP/Final EIS. Instead, the BLM is simply identifying that Alternative C provides the most useful starting point from which to construct a Proposed RMP based on the analysis in this Draft RMP/EIS.

During public review of this draft RMP/EIS, the BLM is seeking constructive input regarding the proposals for managing resources and resource uses. After considering these comments, the BLM will develop a

proposed RMP to be evaluated in the final EIS. The proposed RMP can be any reasonable combination of objectives and management directions from the four alternatives (Alternatives A, B, C, and D) presented in this draft RMP/EIS.

2.4 DETAILED DESCRIPTION OF THE ALTERNATIVES

Section 2.4.3 is a description of all decisions proposed for each alternative, including goals, objectives, allocations, and management direction. All decisions in **Section 2.4.3** are land use plan-level decisions, with the exception of some decisions that are implementation-level decisions, as identified.

2.4.1 How to Read Section 2.4.3

The following describes how the alternatives matrix in **Section 2.4.3** is written and formatted to show the land use plan decisions proposed for each alternative. Refer to **Diagram 2-1** on the next page for an example of how to read **Section 2.4.3**.

- Per the BLM’s Land Use Planning Handbook H-1601-1, land use plan decisions are broadscale decisions that guide future land management directions and subsequent site-specific implementation decisions. Land use plan decisions establish the base structure for desired outcomes through **goals** and **objectives**, and **allocations for allowable resource uses** and **management direction** to achieve outcomes.
- *Goals* are broad statements of desired outcomes and management direction that usually are not quantifiable.
- *Objectives* identify specific desired outcomes for resources. Objectives may be quantifiable and measurable, and they may have established time frames for achievement, as appropriate.
- *Allocations* for allowable resource use identify uses, or allocations, which are allowed, restricted, or prohibited on public lands and mineral estates.
- *Management direction* identifies actions to attain desired outcomes (objectives), including program constraints, general management practices, and support actions. These are measures that will be applied to all subsequent relevant implementation activities to achieve management objectives.
- *Designations* identify geographic areas of public land where management is directed toward one or more priority resource values or uses. They include two types:
 - *Administrative designations*, identified in BLM or U.S. Department of the Interior program-specific polices or regulations, are established through the BLM’s land use planning process to achieve RMP objectives.
 - *Nondiscretionary designations* are those that can only be established by the President, Congress, or the Secretary of the Interior pursuant to specific legal authority.
- In general, only those resources and resource uses that have associated issues have notable differences between the alternatives. Management direction that is applicable to more than one alternative is indicated by denoting that management direction is the same. For example, the direction will say, “Same as Alternative B.”
- Throughout the matrix, the term “discretionary actions” is used to mean actions that require approval from the BLM Authorized Officer.

**Diagram 2-1
How to Read the Alternatives Matrix**

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SOIL RESOURCES					
12.	Goal: Manage uses to prevent damage to and degradation of soil resources and to ensure that soil health is maintained or improved.	Goal: Protect and restore soil resources, including biological soil crusts, to prevent damage to and degradation of soil resources.		Goal: Protect, maintain, enhance and/or restore soil resources.	Goal: Manage uses to prevent damage to and degradation of soil resources and to ensure that soil health is maintained or improved. (GSENM ROD 2020, KEPA ROD 2020)	Goal: Manage uses to prevent damage to soil resources and to ensure that the health and distribution of fragile biological soil crusts is maintained or improved.
13.	Objective: Maintain, improve, and/or restore overall watershed health to reduce erosion, stream sedimentation, and salinization of water, with particular emphasis on the Colorado River System.				Objective: Maintain, improve, and/or restore overall watershed health to reduce erosion, stream sedimentation, and salinization of water, with particular emphasis on the Colorado River System. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
14.	Objective: Ensure soils exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.	Objective: Protect and restore upland soils to meet BLM Utah Rangeland Health Standards (Standard 1).			Objective: Ensure soils exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
15.	Objective: Maintain or enhance soil stability, productivity, and infiltration to prevent accelerated erosion and to provide for optimal plant growth and the site's potential.	Objective: Protect and restore soil health, productivity and stability, and infiltration to prevent erosion from disturbance and to provide for optimal plant growth and site potential.		Objective: Protect, maintain, enhance, and/or restore soil health, productivity and stability, and infiltration to prevent erosion from disturbance and to provide for optimal plant growth and site potential.	Objective: Maintain or enhance soil stability, productivity, and infiltration to prevent accelerated erosion and to provide for optimal plant growth and the site's potential. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
16.	Objective: Maintain, improve, and restore areas of biological soil crust appropriate for the soil type, climate, and landform.				Objective: Maintain, improve, and restore areas of biological soil crust appropriate for the soil type, climate, and landform. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
17.	Objective: Facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts.	Objective: Emphasize research that builds understanding and improves management of soil resources and biological soil crusts.			Objective: Facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Same as Alternative A.
18.	Objective: No similar objective.	Objective: Manage soil resources consistent with ecological site groups (or other best approaches to identify soil types) and projections of climatic factors.			Objective: No similar objective.	Objective: No similar objective.

Merged cells indicate management direction would be the same across those alternatives.

Where Alternative C does not denote different management direction by area, it would be the same across all areas.

The 2020 GSENM and KEPA RMPs and the 2000 Monument Management Plan are provided for reference.

As noted previously, Alternative A represents the decisions from the 2020 GSENM and KEPA Approved RMPs as modified by Proclamation 10286. For context, the decisions from the 2020 Approved RMPs are provided in the alternatives matrix in **Section 2.4.3**. Decisions from the 2000 MMP are also provided; this is because that plan was effective for 20 years and is familiar to the public, users of GSENM, and state and local governments. It also included area management, similar to Alternative C. For these reasons, as well as the short time frame that the 2020 plans have been in effect, the 2000 MMP is also provided as a point of reference.

2.4.2 Components Common to Alternatives B, C, and D

- All actions in GSENM will be consistent with the protection and/or restoration of GSENM objects.
- The BLM will coordinate or consult, as appropriate, with local and state governments, Tribal Nations, and other federal agencies regarding implementation activities (such as projects and implementation plans).
- The BLM will implement the management direction to the extent of its jurisdiction.
- When the BLM is administering grazing in Glen Canyon, the BLM will consult and cooperate with the NPS to ensure that grazing authorizations, range improvements, allotment management plans, management agreements, and resource monitoring and evaluation efforts do not conflict with the Glen Canyon enabling legislation, the NPS Organic Act, or the approved NPS general management plan for Glen Canyon.
- The BLM will engage in active and diverse forms of public education and outreach.
- The BLM will facilitate increased scientific research that furthers understanding of GSENM objects and resources.
- The BLM will catalog, inventory, assess, and monitor GSENM objects using standardized methods, where they exist.
- The BLM will prohibit collection of GSENM objects and resources, including but not limited to rocks, petrified wood, fossils, plants, bones, parts of plants, animals, fish, insects or other invertebrate animals, other products from animals, or other items from within GSENM, except where 1) collection is specifically permitted under applicable BLM authority, or 2) prohibiting collection would be inconsistent with the Religious Freedom Restoration Act or other applicable law. For example, casual collection would not be prohibited where such prohibition constitutes a substantial burden on Tribal Nations' religious practices.
- The BLM will manage livestock grazing to meet the Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah (BLM 1997) in a manner that is consistent with the protection of GSENM objects.
- Habitat for greater sage-grouse occurs in GSENM. The BLM will implement the relevant decisions from the BLM Utah Greater Sage-grouse RMP Amendment (BLM 2019) applicable to habitat in GSENM.
- Following approval of the RMP, the BLM will develop implementation-level plans per management direction.
- Motorized aircraft (including but not limited to fixed wing aircraft, helicopter, powered paragliders, electric aircraft, and unmanned aircraft systems) are managed as OHVs (43 CFR 8340) when on or immediately over agency managed lands and waters.
- The BLM will apply resource conservation measures in **Appendix C**.

2.4.3 Alternatives Comparison

Air Quality	2-17	Livestock Grazing	2-75
Soil Resources	2-19	Recreation and Visitor Services	2-87
Vegetation.....	2-23	Travel and Transportation Management.....	2-98
Water Resources.....	2-30	Lands and Realty	2-106
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Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	AIR QUALITY				Not for analysis. For comparison only.	
1.	Goal: Minimize the impact of management actions on air quality in GSENM by complying with all applicable state and local air quality laws, rules, and regulations.	Goal: Minimize the impact of management actions on air quality in GSENM by complying with all applicable air quality laws, rules, and regulations. Maintain the excellent air quality and air quality related values contained in and near GSENM. Maintain or improve the air quality and air quality related values at sensitive areas (for example, Class I areas) in and near GSENM. Minimize fugitive dust transport from GSENM to maintain visibility and limit dust deposition on snow.			Goal: Minimize the impact of management actions on air quality in the Planning Area by complying with all applicable State and local air quality laws, rules, and regulations. (GSENM ROD 2020, KEPA ROD 2020)	Goal: The BLM's objective with regard to air quality is to ensure that authorizations granted to use public lands and that the BLM's own management programs comply with and support local, state, and federal laws, regulations, and implementation plans pertaining to air quality.
2.	Objective: Manage atmospheric deposition pollutants to below generally accepted levels of concern and levels of acceptable change.	Objective: Work with the state, EPA, and other appropriate regulatory agencies and organizations when deposition of atmospheric pollutants originating outside of GSENM is identified as negatively affecting ecosystems, vegetation, and wildlife within GSENM.			Objective: Manage atmospheric deposition pollutants to below generally accepted levels of concern and levels of acceptable change. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar objective.
3.	Objective: Maintain concentrations of criteria pollutants in compliance with applicable state and federal ambient air quality standards within the scope of the BLM authority.	Objective: Maintain or reduce concentrations of criteria pollutants in compliance with applicable state and federal ambient air quality standards within the scope of the BLM authority.			Objective: Maintain concentrations of criteria pollutants in compliance with applicable state and federal ambient air quality standards within the scope of BLM authority. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
4.	Objective: Reduce visibility-impairing pollutants in accordance with the reasonable progress goals and timeframes established in the State of Utah's Regional Haze State Implementation Plan.	Objective: Minimize visibility-impairing pollutants in accordance with the reasonable progress goals and timeframes established in the State of Utah's Regional Haze State Implementation Plan and within the scope of the BLM authority.			Objective: Reduce visibility-impairing pollutants in accordance with the reasonable progress goals and time frames established in the State of Utah's Regional Haze State Implementation Plan. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
5.	Objective: Manage public land activities consistent with at least the federal Class II area standards and visibility (regional haze) criteria, and no less than any local governments' air quality criteria.				Objective: Manage public land activities consistent with at least the federal Class II area standards and visibility (regional haze) criteria, and no less than any local governments' air quality criteria. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The Monument will continue to be managed as a Prevention of Significant Deterioration Class II area designated by the Clean Air Act.
6.	Management Direction: Mitigate actions that are projected to exceed ambient air quality standards or adversely affect visibility (regional haze) in the Class I air areas.	Management Direction: Mitigate actions that are shown to either (1) exceed ambient air quality standards or (2) adversely affect visibility (regional haze) in the Class I airsheds.			Management Direction: Mitigate actions that are projected to exceed ambient air quality standards or adversely affect visibility (regional haze) in the Class I air areas. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: All BLM actions and use authorizations will be designed or stipulated so as to protect air quality within the Monument and the Class I areas on surrounding federal lands.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	AIR QUALITY				Not for analysis. For comparison only.	
7.	Management Direction: No similar management direction.	Management Direction: Collaborate with federal and state regulatory agencies and land management agencies in and near GSENM for activities identified as having impacts on regional air quality, air quality related values (visibility and atmospheric deposition), and mitigation.			Management Direction: No similar management direction.	Management Direction: Mitigation will be incorporated into project proposals to reduce air quality degradation. Projects will be designed to minimize further degradation of existing air quality. New emission sources will be required to apply control measures to reduce emissions.
8.	Management Direction: No similar management direction.	Management Direction: Work cooperatively with state, federal, and tribal entities to address regional air quality issues that are influenced or affected by the BLM land management actions.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
9.	Management Direction: Manage activities at least within air quality standards established by the EPA and Utah Division of Air Quality and no less than any local governments' air quality standards.				Management Direction: Manage activities at least within air quality standards established by the Environmental Protection Agency and Utah Division of Air Quality and no less than any local governments' air quality standards. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
10.	Management Direction: No similar management direction.	Management Direction: Manage all action and programs to minimize the creation and transportation of dust.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
11.	Management Direction: No similar management direction.	Management Direction: Ensure that prescribed burns conform with the Utah Smoke Management Plan, and they are timed to occur during meteorological conditions that maximize smoke dispersal.			Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SOIL RESOURCES				Not for analysis. For comparison only.	
12.	Goal: Manage uses to prevent damage to and degradation of soil resources and to ensure that soil health is maintained or improved.	Goal: Protect and restore soil resources, including biological soil crusts, to prevent damage to and degradation of soil resources.		Goal: Protect, maintain, enhance and/or restore soil resources.	Goal: Manage uses to prevent damage to and degradation of soil resources and to ensure that soil health is maintained or improved. (GSENM ROD 2020, KEPA ROD 2020)	Goal: Manage uses to prevent damage to soil resources and to ensure that the health and distribution of fragile biological soil crusts is maintained or improved.
13.	Objective: Maintain, improve, and/or restore overall watershed health to reduce erosion, stream sedimentation, and salinization of water, with particular emphasis on the Colorado River System.				Objective: Maintain, improve, and/or restore overall watershed health to reduce erosion, stream sedimentation, and salinization of water, with particular emphasis on the Colorado River System. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
14.	Objective: Ensure soils exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.	Objective: Protect and restore upland soils to meet BLM Utah Rangeland Health Standards (Standard I).			Objective: Ensure soils exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
15.	Objective: Maintain or enhance soil stability, productivity, and infiltration to prevent accelerated erosion and to provide for optimal plant growth and the site's potential.	Objective: Protect and restore soil health, productivity and stability, and infiltration to prevent erosion from disturbance and to provide for optimal plant growth and site potential.		Objective: Protect, maintain, enhance, and/or restore soil health, productivity and stability, and infiltration to prevent erosion from disturbance and to provide for optimal plant growth and site potential.	Objective: Maintain or enhance soil stability, productivity, and infiltration to prevent accelerated erosion and to provide for optimal plant growth and the site's potential. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
16.	Objective: Maintain, improve, and restore areas of biological soil crust appropriate for the soil type, climate, and landform.				Objective: Maintain, improve, and restore areas of biological soil crust appropriate for the soil type, climate, and landform. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
17.	Objective: Facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts.	Objective: Emphasize research that builds understanding and improves management of soil resources and biological soil crusts.			Objective: Facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Same as Alternative A.
18.	Objective: No similar objective.	Objective: Manage soil resources consistent with ecological site groups (or other best approaches to identify soil types) and projections of climatic factors.			Objective: No similar objective.	Objective: No similar objective.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SOIL RESOURCES				Not for analysis. For comparison only.	
19.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Within 2 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations within the following watersheds:</p> <ul style="list-style-type: none"> • Horse Canyon-Escalante River • Upper Paria • Hackberry Canyon-Cottonwood Creek • Upper Wahweap Creek • Upper Johnson Wash • White Sage Wash • Boulder Creek-Escalante River • Middle Paria <p>Based on the causal factor determination, and within 5 years of the signing of the ROD, take appropriate actions that will result in significant progress toward fulfillment of the land health standards.</p> <p>Once the assessments/determinations have been completed in these priority watersheds and appropriate management actions taken to rectify issues, conduct land health assessments and, if needed, causal factor, determinations, across GSENM, within 10 years of the signing of the ROD.</p>		<p>Management Direction: Within 10 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations across GSENM.</p>	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>
20.	<p>Management Direction: Lands managed under the GSENM RMP (2020) require measures to stabilize soils and minimize surface water runoff for slopes greater than 10 percent, both during project activities and following project completion.</p> <p>Lands managed under the KEPA RMP (2020) require measures to stabilize soils and minimize surface water runoff for slopes greater than 15 percent, both during project activities and following project completion.</p>	<p>Management Direction: Require measures to stabilize soils and minimize surface water runoff for actions on slopes greater than 10 percent.</p>			<p>Management Direction: Require measures to stabilize soils and minimize surface water runoff for slopes greater than 10%, both during project activities and following project completion. (GSENM ROD 2020)</p> <p>Require measures to stabilize soils and minimize surface water runoff for slopes greater than 15%, both during project activities and following project completion. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SOIL RESOURCES				Not for analysis. For comparison only.	
21.	<p>Management Direction: Prohibit surface-disturbing activities on slopes greater than 30 percent, with exceptions considered. Manage as a ROW avoidance area.</p>	<p>Management Direction: Avoid soil-disturbing discretionary actions on slopes greater than 30 percent.</p>		<p>Management Direction: Prohibit soil-disturbing discretionary actions on slopes greater than 30 percent.</p>	<p>Management Direction: Prohibit surface-disturbing activities on slopes greater than 30%, with exceptions considered. Manage as a ROW avoidance area. (GSENM ROD 2020)</p> <p>Prohibit surface disturbing activities on slopes greater than 30%, with exceptions considered. This includes a no surface occupancy stipulation, with exceptions considered. Manage as a ROW avoidance area. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
22.	<p>Management Direction: Prior to allowing surface disturbance in fragile or sensitive soil areas (such as saline soils, highly erosive, and late successional biological, expansive), operators may be required to submit a soil health and restoration plan that includes site-specific mitigation measures for activities proposed in fragile or sensitive soil areas. If required, the BLM must approve the plan before surface-disturbing activities are authorized. The BLM may allow surface disturbance in fragile or sensitive soil areas as long as impacts would be mitigated.</p>	<p>Management Direction: Avoid soil-disturbing actions on vulnerable soils, biological soil crusts, areas of soil vulnerability (such as erosion, mass movement, and potential loss of function), and in areas determined as having low restoration potential. Exceptions would be made for actions for purposes of land health restoration or where the action would not cause sustained degradation of soil resources.</p> <p>Livestock grazing is managed through allotment management plans, which consider the protection, maintenance, enhancement, and restoration of soil resources.</p>	<p>Management Direction: <u>Front Country and Passage Areas:</u> Same as Alternative B.</p> <p><u>Outback and Primitive Areas:</u> Prohibit soil-disturbing actions on vulnerable, biological soil crusts, areas of soil vulnerability (such as erosion, mass movement, and potential loss of function), and in areas determined as having low restoration potential. Exceptions would be made for actions for purposes of land health restoration or where the action would not cause sustained degradation of soil resources.</p> <p>Livestock grazing is managed through allotment management plans, which consider the protection, maintenance, enhancement, and restoration of soil resources.</p>	<p>Management Direction: Prohibit soil-disturbing actions on vulnerable, biological soil crusts, areas of soil vulnerability (such as erosion, mass movement, and potential loss of function), and in areas determined as having low restoration potential. Exceptions would be made for actions for purposes of land health restoration.</p> <p>Livestock grazing is managed through allotment management plans, which consider the protection, maintenance, enhancement, and restoration of soil resources.</p>	<p>Management Direction: Prior to allowing surface disturbance in fragile or sensitive soil areas (such as saline soils, highly erosive, late successional biological, expansive), operators may be required to submit a soil health and restoration plan that includes site-specific mitigation measures for activities proposed in fragile or sensitive soil areas. If required, the BLM must approve the plan before surface-disturbing activities are authorized. The BLM may allow surface disturbance in fragile or sensitive soil areas as long as impacts would be mitigated. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
23.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Prior to allowing soil-disturbing discretionary actions on vulnerable, biological soil crusts, and areas of soil vulnerability (such as erosion, mass movement, and potential loss of function), a soil health and restoration plan will be developed and approved. The plan will include site-specific mitigation that fully avoids, minimizes, and/or compensates for adverse effects on these soil resources. The plan will also include the following requirement: Soils and biological soil crusts will be properly removed, and remain either on site or within GSENM, for use during reclamation, restoration, and/or scientific purposes.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SOIL RESOURCES				Not for analysis. For comparison only.	
24.	<p>Management Direction: On lands managed under the GSENM RMP (2020), apply procedures to protect soils from accelerated or unnatural erosion in any ground-disturbing activity, including route maintenance and restoration. The effects of activities such as grazing developments, mineral exploration or development, or water developments will be analyzed through the preparation of project-specific NEPA documents. This process will include inventories for affected resources and the identification of mitigation measures.</p> <p>Prior to any ground-disturbing activity, the potential effects on biological soil crusts will be considered and steps will be taken to avoid impacts on their function, health, and distribution. Long-term research toward preservation and restoration of soils will be part of the adaptive management framework.</p>	<p>Management Direction: No similar management direction (see previous actions).</p>			<p>Management Direction: Apply procedures to protect soils from accelerated or unnatural erosion in any ground-disturbing activity, including route maintenance and restoration. The effects of activities such as grazing developments, mineral exploration or development, or water developments will be analyzed through the preparation of project specific NEPA documents. This process will include inventories for affected resources and the identification of mitigation measures.</p> <p>Prior to any ground-disturbing activity, the potential effects on biological soil crusts will be considered and steps will be taken to avoid impacts on their function, health, and distribution. Long-term research toward preservation and restoration of soils will be part of the adaptive management framework. (GSENM ROD 2020)</p>	<p>Management Direction: Same as Alternative A.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VEGETATION				Not for analysis. For comparison only.	
25.	Goal: Ensure a mosaic of desired vegetation communities is present across the landscape with diversity of species, canopy, density, and age class in accordance with ecological site potential.	Goal: Manage for a resistant, resilient mosaic of desired vegetation communities across the landscape with diversity of species, canopy, density, and age class in accordance with ecological site potential.			Goal: Ensure a mosaic of desired vegetation communities is present across the landscape with diversity of species, canopy, density, and age class in accordance with ecological site potential. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
26.	Goal: Protect, enhance, and/or restore ecological processes and functions.	Goal: Protect and restore ecological processes and functions to increase climate resiliency through proactive vegetation management.	Goal: <u>Front Country, Passage, and Outback Areas:</u> Same as Alternative B. <u>Primitive Area:</u> Same as Alternative D.	Goal: Protect, maintain, enhance, and/or restore ecological processes and functions to increase climate resiliency, prioritizing natural processes and techniques over other methods.	Goal: Protect, enhance, and/or restore ecological processes and functions. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
27.	Objective: Manage sagebrush communities to provide quality habitat necessary to maintain sustainable populations of sagebrush obligate species. Manage undesirable and desirable vegetation with the goal of improving overall watershed conditions.	Objective: Protect and restore functional vegetation communities, including sagebrush communities, support watershed function, reduce fugitive dust, and provide quality habitat necessary to maintain sustainable wildlife populations, including sagebrush-obligate species.		Objective: Protect, maintain, enhance, and/or restore native functional vegetation communities, including sagebrush communities to support watershed function, and provide quality habitat necessary to maintain sustainable wildlife populations, including sagebrush-obligate species).	Objective: Manage sagebrush communities to provide quality habitat necessary to maintain sustainable populations of sagebrush obligate species. (GSENM ROD 2020, KEPA ROD 2020) Manage undesirable and desirable vegetation with the goal of improving overall watershed conditions. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
28.	Objective: Restore native species to meet desired plant community objectives.				Objective: Restore native species to meet desired plant community objectives. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
29.	Objective: Maintain healthy stands of ponderosa pine.	Objective: No similar objective (<i>this is covered by the overall objective for functional vegetation communities</i>).			Objective: Maintain healthy stands of ponderosa pine. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
30.	Objective: Maintain and/or restore riparian areas to proper functioning condition (PFC), or making significant progress toward PFC, where BLM-managed or BLM-authorized activities have been identified as contributing to riparian impairment.	Objective: Protect and restore riparian areas to proper functioning condition.		Objective: Protect, maintain, enhance, and/or restore riparian areas to proper functioning condition.	Objective: Maintain and/or restore riparian areas to proper functioning condition (PFC), or making significant progress toward proper functioning condition, where BLM-managed or BLM-authorized activities have been identified as contributing to riparian impairment. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Monitoring of riparian resource conditions will be established to determine when actions should be taken to ensure movement towards proper functioning condition on all riparian stream segments in the Monument.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VEGETATION				Not for analysis. For comparison only.	
31.	Objective: Ensure water quantity and quality for multiple-use management, consistent with the protection of GSENM objects and functioning, healthy riparian and upland systems.	Objective: Proactively manage uplands, riparian areas, and waterways to protect and restore water quantity and quality.		Objective: Proactively manage uplands, riparian areas, and waterways to protect, maintain, enhance, and restore water quantity and quality.	Objective: Ensure water quantity and quality for multiple-use management and functioning, healthy riparian and upland systems. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The information in the Water section describes a strategy for assuring water availability. Under that strategy, priority will be to maintain natural flows and flood events. In addition, the maintenance of instream flows will provide adequate water for natural structure and function of riparian vegetation.
32.	Objective: Manage relict plant communities and hanging gardens to maintain and enhance biological diversity.	Objective: Manage reference plant communities to protect and restore biological diversity.		Objective: Manage reference plant communities to protect, maintain, enhance, and restore biological diversity.	Objective: Manage relict plant communities and hanging gardens to maintain and enhance biological diversity. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Protect unique vegetation associations such as hanging gardens and relict plant associations.
33.	Objective: Create and maintain a mosaic of noninvasive perennial and annual vegetation communities across the landscape with diversity of species, canopy, density, and different stages of growth.	Objective: Protect and restore a mosaic of noninvasive perennial and annual vegetation communities across the landscape with diversity of species, canopy, density, and different stages of composition.		Objective: Protect, maintain, enhance, and/or restore a mosaic of native perennial and annual vegetation communities across the landscape with diversity of species, canopy, density, and different stages of composition.	Objective: Create and maintain a mosaic of noninvasive perennial and annual vegetation communities across the landscape with diversity of species, canopy, density, and different stages of growth. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
34.	Management Direction: No similar management direction.	Management Direction: Within 2 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations within the following watersheds: <ul style="list-style-type: none"> • Horse Canyon-Escalante River • Upper Paria • Hackberry Canyon-Cottonwood Creek • Upper Wahweap Creek • Upper Johnson Wash • White Sage Wash • Boulder Creek-Escalante River • Middle Paria <p>Based on the causal factor determination, and within 5 years of the signing of the ROD, take appropriate actions that will result in significant progress toward fulfillment of the land health standards.</p> <p>Once the assessments/determinations have been completed in these priority watersheds and appropriate management actions taken to rectify issues, conduct land health assessments and, if needed, causal factor determinations, across GSENM, within 10 years of the signing of the ROD.</p>		Management Direction: Within 10 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations across GSENM.	Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VEGETATION				Not for analysis. For comparison only.	
35.	Management Direction: No similar management direction.	Management Direction: Use soil and biological soil crust resource conditions, desired conditions mapping, and hydrologic conditions and trends information, as available, as a basis in design and rationale for vegetation management proposals.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
36.	Management Direction: Use the full range of vegetation treatment methods and tools (such as chaining, prescribed fire, mechanical, chemical, biological, and woodland product removal). Prioritize treatments in areas where removal of woodland products would improve rangeland health, wildlife habitat, and forage. This decision also applies to nonstructural range improvements.	Management Direction: Implement landscape-scale ecosystem restoration projects to restore functional vegetation communities.		Management Direction: Implement landscape-scale ecosystem restoration projects to restore native functional vegetation communities, with a prioritization of natural processes and techniques over other methods.	Management Direction: Use the full range of vegetation treatment methods and tools (such as chaining, prescribed fire, mechanical, chemical, biological, woodland product removal). Prioritize treatments in areas where removal of woodland products would improve rangeland health, wildlife habitat, and forage. This decision would also apply to nonstructural range improvements. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VEGETATION				Not for analysis. For comparison only.	
37.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: For all vegetation management efforts, maximize potential for lasting resilient restoration through the preferential use of native vegetation. Nonnative vegetation may be used in restoration efforts as consistent with project and site-specific consideration and rational, to best support recovery of site integrity and resilience. Use adaptive management to ensure that health of these efforts is maintained.</p>		<p>Management Direction: For all vegetation management efforts, manage for the restoration and/or persistence of resistant and resilient landscapes through the use of only native vegetation. However, the use of nonnative vegetation may be approved in phased restoration efforts that lead towards a native vegetation community or for emergency actions where native vegetation is not reasonably available. Use adaptive management to ensure that health of these efforts is maintained.</p>	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: In keeping with the overall vegetation objectives [that is, increase public education and appreciation of vegetation through interpretation, facilitate appropriate research to improve understanding and management of vegetation, and protect unique vegetation associations such as hanging gardens and relict plant associations] and Presidential Executive Order 11312, native plants will be used as a priority for all projects in the Monument.</p> <p>Nonnative plants may be used in limited, emergency situations where they may be necessary in order to protect Monument resources by stabilizing soils and displacing noxious weeds. This use will be allowed to the extent that it complies with the vegetation objectives, Presidential Executive Order 11312, and the Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah (1997). In these situations, short-lived species (that is, nurse crop species) will be used and will be combined with native species to facilitate the ultimate establishment of native species.</p> <p>Nonnative plants may be used for restoration related research if the use is consistent with and furthers the overall vegetation management objectives, including [the objective] above, and after consultation with the GSENM Advisory Committee.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VEGETATION				Not for analysis. For comparison only.	
38.	<p>Management Direction: After surface disturbance, manage livestock grazing practices until seedings are established to promote the survival of plants. Generally, areas will be rested from livestock grazing for two growing seasons or until site objectives are met. Vegetation treatment monitoring data will be evaluated to determine when objectives for the seedings are met, and grazing can be resumed.</p>	<p>Management Direction: After vegetation management activities involving seeding (such as fire rehabilitation, restoration, and nonstructural range improvement), manage livestock grazing practices until seedings are established to promote the survival of plants. Areas will be rested for a minimum of two growing seasons and until site objectives are met. Vegetation monitoring data will be evaluated to determine when objectives for the seedings are met and when grazing can be resumed.</p>			<p>Management Direction: After surface disturbance, manage livestock grazing practices until seedings are established in order to promote the survival of plants. Generally, areas will be rested from livestock grazing for two growing seasons or until site objectives are met. Vegetation treatment monitoring data will be evaluated to determine when objectives for the seedings are met, and grazing can be resumed. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Livestock grazing after native seedings are established will be modified to ensure the survival of the native plants. The livestock exclusion period required to allow full establishment of seeded native species and recovery of surviving native plants after a wildfire may be more than 2 years. Site evaluation will be required to determine when the native seedings should be grazed again and the effectiveness of the current or new grazing system on the persistence of native plants.</p>
39.	<p>Management Direction: Prohibit vegetation restoration methods in relict plant communities and hanging gardens, unless needed for removal of noxious weed species. Prohibit camping, overnight stays, and campfires in relict plant communities and hanging gardens. Make exceptions for scientific and research purposes as determined by the BLM Authorized Officer.</p>	<p>Management Direction: Prohibit discretionary actions in reference plant communities, unless needed for removal of invasive weed species threatening intact communities, or to ensure biological integrity of these communities.</p>			<p>Management Direction: Prohibit vegetation restoration methods in relict plant communities and hanging gardens, unless needed for removal of noxious weed species. (GSENM ROD 2020) Prohibit camping, overnight stays, and campfires in relict plant communities and hanging gardens. Make exceptions for scientific and research purposes as determined by the authorized officer (GSENM ROD 2020).</p>	<p>Management Direction: Vegetation restoration methods (that is, mechanical methods, use of machinery [such as roller chopping, chaining, plowing, and discing], chemical methods, biological control, management ignited fire) will not be allowed in these areas, unless needed for removal of noxious weed species. In these circumstances, consultation with the GSENM Advisory Committee will be used to determine the most appropriate control methods to ensure proper protection. Camping, overnight stays, and campfires in these areas will not be allowed (that is, in relict plant communities and hanging gardens).</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VEGETATION				Not for analysis. For comparison only.	
40.	Management Direction: Avoid new surface-disturbing activities within 330 feet of riparian/wetland areas unless it could be shown that (1) there are no practical alternatives (such as a designated utility corridor), (2) all long-term impacts could be fully mitigated, or (3) the activity would benefit and enhance the riparian area. Apply ROW avoidance.	Management Direction: Avoid new discretionary actions within 330 feet of riparian/wetland areas unless topographic boundaries limit the distance, and the action will result in no adverse impact on riparian/wetland areas.	Management Direction: <u>Front Country, Passage, and Outback Areas:</u> Same as Alternative B. Primitive Area: Same as Alternative D.	Management Direction: Avoid new discretionary actions within 330 feet of riparian/wetland areas unless topographic boundaries limit the distance, and the action will enhance riparian/wetland areas.	Management Direction: Avoid new surface-disturbing activities within 330 feet of riparian/wetland areas unless it could be shown that (1) there are no practical alternatives (such as a designated utility corridor), (2) all long-term impacts could be fully mitigated, or (3) the activity would benefit and enhance the riparian area. Apply Controlled Surface Use on federal mineral leasing and ROWs avoidance. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
41.	Management Direction: Allow surface-disturbing research in relict plant communities if the research is designed to promote the overall health and understanding of these areas.	Management Direction: Prohibit discretionary actions within riparian communities associated with hanging gardens, with the exception of actions that protect the hanging gardens.			Management Direction: Allow surface-disturbing research in relict plant communities if the research is designed to promote the overall health and understanding of these areas. (GSENM ROD 2020) Allow surface-disturbing research in relict plant communities and hanging gardens with implementation of vegetation best management practices (BMPs). (KEPA ROD 2020)	Management Direction: Protect unique vegetation associations such as hanging gardens and relict plant associations. Surface disturbing research will not be allowed in these areas (that is, relict plant communities and hanging gardens).
42.	Management Direction: Prevent establishment of new invasive species through early detection and rapid response actions.	Management Direction: Prevent the establishment of invasive species and control the spread of established invasive species through early detection and rapid response actions.			Management Direction: Prevent establishment of new invasive species through early detection and rapid response actions. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: For major removal projects, monitoring plots will be established in key areas to determine effectiveness of methods and presence of noxious weed species.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VEGETATION				Not for analysis. For comparison only.	
43.	<p>Management Direction: Control noxious weed species and prevent the introduction of new invasive species in conjunction with Cooperative Weed Management Areas.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: Control noxious weed species and prevent the introduction of new invasive species in conjunction with Cooperative Weed Management Areas. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: The BLM will control noxious weeds in accordance with National and State policies and directives. Control of noxious weeds is also a priority to achieve the overall vegetation objectives stated above (that is, increase public education and appreciation of vegetation through interpretation, facilitate appropriate research to improve understanding and management of vegetation, and protect unique vegetation associations such as hanging gardens and relict plant associations).</p> <p>Projects will be designed in conjunction with Kane and Garfield Counties and adjacent Forest Service and NPS staffs. With this strategy the BLM hopes to control noxious weed species and prevent introduction of new invasive species into the Monument and surrounding ecosystems.</p>
44.	<p>Management Direction: Allow approved weed-control methods to all invasive species in an integrated weed management program (including, but not limited to, preventive management; education; and mechanical, biological, wildland or prescribed fire, and chemical techniques).</p>	<p>Management Direction: Implement an integrated weed management program to control weeds using methods appropriate to each site.</p>	<p>Management Direction: Same as Alternative B.</p>		<p>Management Direction: Allow approved weed-control methods to all invasive species in an integrated weed management program (including but not limited to preventive management; education; and mechanical, biological, wildland or prescribed fire, and chemical techniques). (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WATER RESOURCES				Not for analysis. For comparison only.	
45.	Goal: Ensure that appropriate quality and quantity of water resources are available for the proper care and management of GSENM objects.	Goal: Protect and restore the quality and quantity of water resources.		Goal: Protect, maintain, enhance and/or restore the quality and quantity of water resources.	Goal: Ensure that appropriate quality and quantity of water resources are available for the proper care and management of objects of GSENM and resources of GSENM. (GSENM ROD 2020) Ensure that appropriate quality and quantity of water resources are available for resources of KEPA. (KEPA ROD 2020)	Goal: Ensure that appropriate quality and quantity of water resources are available for the proper care and management of the objects of the Monument.
46.	Objective: No similar objective.	Objective: Manage aquatic habitat and water uses to help increase climate resiliency in consideration of expected changes in water availability.			Objective: No similar objective.	Objective: No similar objective.
47.	Objective: Maintain, enhance, and/or restore natural hydrologic functions of watersheds, including the capability to capture, store, and beneficially release water.	Objective: Protect and restore natural hydrologic functions of watersheds to meet BLM Utah Rangeland Health Standards (Standard 2).		Objective: Protect, maintain, enhance, and/or restore natural hydrologic function of watersheds to meet BLM Utah Rangeland Health Standards (Standard 2).	Objective: Maintain, enhance, and/or restore natural hydrologic functions of watersheds, including the capability to capture, store, and beneficially release water. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Ensure that land management policies protect water resources. Since much of the water important to the Monument falls as precipitation within the Monument, its continued availability can be ensured by appropriate land management policies within the Monument. The BLM will exercise its existing land management authorities to protect and maintain all available water and natural flows in the Monument. Several decisions described in other sections of this Plan are designed to meet this objective.
48.	Objective: Improve watershed conditions on eroding sites and on other sensitive watershed areas, such as riparian areas.	Objective: Protect and restore watershed hydrologic conditions (such as minimizing sheet and rill erosion and increasing infiltration rate) in sensitive or impaired watersheds, and riparian areas.		Objective: Protect, maintain, enhance and/or restore watershed hydrologic conditions (such as minimizing sheet and rill erosion and increasing infiltration rate) in sensitive or impaired watersheds and riparian areas.	Objective: Improve watershed conditions on eroding sites and on other sensitive watershed areas, such as riparian areas. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
49.	Objective: Maintain and/or improve water quality to meet state water quality standards and the BLM Utah Rangeland Health Standards.	Objective: Protect and restore water quality to meet State of Utah water quality standards and the BLM Utah Rangeland Health Standards (Standard 4).		Objective: Protect, maintain, enhance and/or restore water quality to meet state water quality standards and the BLM Utah Rangeland Health Standards (Standard 4).	Objective: Maintain and/or improve water quality to meet State water quality standards and the Utah Standards and Guidelines for Rangeland Health. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The BLM will continue to work with Utah Department of Environmental Quality, Division of Water Quality (UDWQ) as water quality improvement programs and total maximum daily loads are developed.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WATER RESOURCES				Not for analysis. For comparison only.	
50.	<p>Objective: No similar objective.</p>	<p>Objective: Protect and restore available surface and groundwater into and out of GSENM. Prioritize the maintenance of natural flows and flood events.</p>		<p>Objective: Protect, maintain, enhance, and/or restore available surface and ground water into and out of GSENM.</p>	<p>Objective: No similar objective.</p>	<p>Objective: Monitor to ensure water flowing into the Monument is adequate to support Monument resources. The purpose of the above measures is to protect water that originates in the Monument or water after it enters the Monument boundary. While these measures are currently considered adequate to ensure the continued availability of water to support Monument resources, the BLM will also assess whether the water flows coming into the Monument continue to be adequate. This will be part of an overall strategy to assess the status of water resources within the Monument.</p> <p>The BLM will work with the Water Resources Division of the U.S. Geological Survey, the Utah Department of Natural Resources, and others to gather comprehensive information concerning precipitation, surface water flows, and subsurface water flows into and out of the Monument. This could include establishing additional stream-gauging stations at selected locations, and continued inventorying of water sources such as seeps, springs, and wells.</p>
51.	<p>Objective: No similar objective.</p>	<p>Objective: Protect and restore surface and groundwater quality and conditions to avoid outbreaks of harmful algal blooms.</p>		<p>Objective: Protect, maintain, enhance, and/or restore surface and groundwater quality and conditions to avoid outbreaks of harmful algal blooms.</p>	<p>Objective: No similar objective.</p>	<p>Objective: No similar objective.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
WATER RESOURCES						
Not for analysis. For comparison only.						
52.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Within 2 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations within the following watersheds:</p> <ul style="list-style-type: none"> • Horse Canyon-Escalante River • Upper Paria • Hackberry Canyon-Cottonwood Creek • Upper Wahweap Creek • Upper Johnson Wash • White Sage Wash • Boulder Creek-Escalante River • Middle Paria <p>Based on the causal factor determination, and within 5 years of the signing of the ROD, take appropriate actions that will result in significant progress toward fulfillment of the land health standards.</p> <p>Once the assessments/determinations have been completed in these priority watersheds and appropriate management actions taken to rectify issues, conduct land health assessments and, if needed causal factor, determinations, across GSENM, within 10 years of the signing of the ROD.</p>		<p>Management Direction: Within 10 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations across GSENM.</p>	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>
53.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Consider hydrological function (at the 12th hydrologic unit code scale) when designing landscape scale vegetation management actions and design projects to protect hydrologic function.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>
54.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Mitigate impacts on water quality from discretionary actions by implementing minimization or avoidance techniques, to restore impaired waters listed in the most recent State 305b Water Quality Report.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>
55.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Do not authorize activities that will contribute to the listing of waterbodies as impaired under Clean Water Act Section 303(d) or that will lead to further degradation of waterbodies listed as impaired.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WATER RESOURCES				Not for analysis. For comparison only.	
56.	<p>Management Direction: To protect and maintain water and natural flows, including water flowing into GSENM from adjacent lands, the BLM will (1) exercise its existing land management authorities to protect and maintain available water and natural flows into and out of GSENM and (2) encourage the development of major visitor centers and facilities in nearby communities.</p>	<p>Management Direction: Prevent the loss of water (surface and ground) quantities in GSENM through proactive management actions and by ensuring discretionary actions minimize water use.</p> <p>Implement actions to protect and restore the availability of surface water and groundwater within GSENM.</p>		<p>Management Direction: Prevent the loss of water (surface and ground) quantities in GSENM through proactive management actions and by ensuring discretionary actions would not cause a net loss of water quantity in the applicable watershed or aquifer.</p> <p>Implement actions to protect, maintain, enhance and/or restore the availability of surface water and groundwater within GSENM, without the development of additional human-made infrastructure.</p>	<p>Management Direction: To protect and maintain water and natural flows, including water flowing into GSENM from adjacent lands, the BLM will (1) exercise its existing land management authorities to protect and maintain available water and natural flows into and out of GSENM, and (2) encourage the development of major visitor centers and facilities in nearby communities. (GSENM ROD 2020)</p> <p>To protect and maintain water and natural flows, including water flowing into KEPA from adjacent lands, the BLM will exercise its existing land management authorities to protect and maintain available water and natural flows into and out of KEPA. (KEPA ROD 2020)</p>	<p>Management Direction: Ensure that land management policies protect water resources. Since much of the water important to the Monument falls as precipitation within the Monument, its continued availability can be ensured by appropriate land management policies within the Monument.</p> <p>Major visitor centers and facilities will be located outside of the Monument in local communities where there will be access to municipal water systems.</p> <p>The BLM will exercise its existing land management authorities to protect and maintain all available water and natural flows in the Monument.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WATER RESOURCES					
	Not for analysis. For comparison only.					
57.	<p>Management Direction: Allow water sources to be developed for beneficial recreation and visitor-related uses in high-use remote areas, such as trailheads and recreational facilities.</p>	<p>Management Direction: Allow water sources to be developed to support recreation and visitor-related uses in high-use areas, such as trailheads and recreational facilities.</p>	<p>Management Direction: <u>Front Country Area:</u> Allow development and maintenance of water sources to support recreation and visitor-related uses. <u>Passage, Outback, and Primitive Areas:</u> Same as Alternative D.</p>	<p>Management Direction: Prohibit new recreation related water developments, unless beneficial for natural resource maintenance, restoration, or protection of GSENM objects.</p>	<p>Management Direction: Allow water sources to be developed for beneficial recreation and visitor-related uses in high-use remote areas, such as trailheads and recreational facilities. (GSENM ROD 2020)</p>	<p>Management Direction: The need for water for visitor facilities within the Monument will be minimal because the only facilities provided will be a relatively small number of modest pullouts, toilets, parking areas, trailheads, and picnic sites. Most of these sites do not require water, including most toilet facilities which could use other technologies. In the limited cases where water is needed for a visitor facility, the acquisition of State appropriative water rights (that is, where water is needed for visitor facilities, the BLM may obtain appropriative water rights under Utah State law where the BLM meets Utah State law requirements. Campground, visitor, sanitary, and other administrative uses are clearly “beneficial uses of water” under Utah State law, for which water rights may be granted by the Utah State Engineer. Furthermore, none of the four administrative basins established by the Utah State Engineer has yet been closed to new appropriations because they are not considered fully appropriated. Utah State law also allows the United States and the BLM, as the landowner/managing entity, to obtain such water rights in its own name, rather than the actual users [that is, the visitors]) should be possible.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WATER RESOURCES					
	Not for analysis. For comparison only.					
58.	<p>Management Direction: Allow new water developments and maintenance of existing water developments to improve livestock and wildlife distribution.</p>	<p>Management Direction: Allow new water developments if they contribute to the protection, restoration, and/or increase the resiliency of GSENM objects or resources.</p> <p>Existing water developments for livestock or native terrestrial wildlife could be maintained or modified, where it protects, restores, and/or increases the resiliency of GSENM objects.</p>	<p>Management Direction: <u>Front Country, Outback and Passage Areas:</u> Same as Alternative B.</p> <p><u>Primitive Area:</u> Same as Alternative D.</p>	<p>Management Direction: Prohibit new water developments unless the primary purpose of the water development is to protect or restore the resiliency GSENM objects.</p> <p>Existing water developments for livestock or native terrestrial wildlife could be maintained or modified, where it protects, restores, and/or increases resiliency of GSENM objects.</p>	<p>Management Direction: Allow new water developments and maintenance of existing water developments to improve livestock and wildlife distribution. (GSENM ROD 2020)</p>	<p>Management Direction: New water developments for other uses could be permitted for the following purposes: better distribution of livestock when deemed to have an overall beneficial effect on Monument resources, or to restore or manage native species or populations. These developments could only be done when a NEPA analysis determines this tool to be the best means of achieving the above objectives and only when the water development will not dewater springs or streams.</p>
59.	<p>Management Direction: Prohibit new water developments in relict plant communities and hanging gardens. Allow maintenance activities, if these resources are not affected.</p>	<p>Management Direction: Prohibit new water developments in natural plant communities that lack invasives. Allow maintenance of existing developments in a manner that minimizes impacts on natural plant communities and to best conserve multiple resources.</p>		<p>Management Direction: Prohibit new water developments in natural plant communities that lack invasives. Existing improvements would be removed unless this would additionally harm resources.</p>	<p>Management Direction: Prohibit new water developments in relict plant communities and hanging gardens. Allow maintenance activities, if these resources are not affected. (GSENM ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
60.	<p>Management Direction: Avoid surface-disturbing actions in Drinking Water Source Protection Areas and culinary water sources. Develop strategies to mitigate any existing BLM-authorized activities that pose a threat to public water systems (GSENM ROD 2020). Allow surface-disturbing activities within Drinking Water Source Protection Areas where the disturbance does not degrade the resource and it is consistent with protection of GSENM objects. In these areas, locate permanent facilities to eliminate potential contamination or pollution sources, and design facilities to prevent contaminated discharges to groundwater (KEPA ROD 2020).</p>	<p>Management Direction: Avoid degradation of water resources from surface and/or subsurface discretionary actions in all surface and groundwater Drinking Water Source Protection Areas, culinary water sources, and/or sole source aquifers as identified by the UDWQ. Develop strategies to reduce adverse effects of existing BLM-authorized activities that pose a threat to public water systems and or/facilities.</p>		<p>Management Direction: Prohibit degradation of water resources (as consistent with valid existing rights) from surface and/or subsurface discretionary actions in all surface and groundwater Drinking Water Source Protection Areas, culinary water sources, and/or sole source aquifers as identified by the UDWQ.</p>	<p>Management Direction: Avoid surface-disturbing actions in Drinking Water Source Protection Zones and culinary water sources. Develop strategies to mitigate any existing BLM-authorized activities that pose a threat to public water systems. (GSENM ROD 2020) Allow surface-disturbing activities within Drinking Water Source Protection Zones where the disturbance does not degrade the resource. In these areas locate permanent facilities to eliminate potential contamination or pollution sources, and design facilities to prevent contaminated discharges to groundwater. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	CULTURAL RESOURCES				Not for analysis. For comparison only.	
61.	<p>Goal: Provide for the proper care and maintenance of cultural resources. Identify, preserve, and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations on BLM-managed surface lands.</p> <p>Seek to reduce imminent threats and resolve potential conflicts from natural or human-caused deterioration, or potential conflict with other resource uses.</p>	<p>Goal: Identify, document, preserve, and protect cultural resources and ensure that they are available for appropriate uses by present and future generations on BLM-managed lands.</p>			<p>Goal: Provide for the proper care and maintenance of cultural resources. Identify, preserve, and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations on BLM-administered surface lands. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Seek to reduce imminent threats and resolve potential conflicts from natural or human-caused deterioration, or potential conflict with other resource uses. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Goal: Identify, document, and protect the array of archaeological resources in the Monument (MMP 2000).</p> <p>Manage uses to prevent damage to archaeological resources, increase public education and appreciation of archaeological resources through interpretation (MMP 2000).</p>
62.	<p>Objective: Seek to restore and stabilize important and at-risk cultural resources.</p>	<p>Objective: Identify, preserve, and protect cultural resources, in place and in their original context.</p>			<p>Objective: Seek to restore and stabilize important and at-risk cultural resources. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Objective: No similar objective.</p>
63.	<p>Objective: Provide opportunities for traditional (such as local heritage) uses of cultural resources and landscapes.</p>	<p>Objective: Provide opportunities to connect to pioneer heritage.</p>			<p>Objective: Provide opportunities for traditional (such as Native American or other local heritage) uses of cultural resources, sacred sites, landscapes, and native plants. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Objective: No similar objective.</p>
64.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Identify, monitor, and stabilize at-risk cultural resources.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: The BLM will continue to inventory and conduct project compliance for archaeological resources. This will be done in order to evaluate their potential for protection, conservation, research, or interpretation (MMP 2000)</p>
65.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Avoid, reduce, and/or remove imminent and long-term threats to cultural resources.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>
66.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Manage high probability cultural resource areas (Class I – existing information inventory) as ROW avoidance. (See <i>Lands and Realty</i> section.)</p>		<p>Management Direction: Manage high probability cultural resource areas (Class I) as ROW exclusion. (See <i>Lands and Realty</i> section.)</p>	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
CULTURAL RESOURCES						
Not for analysis. For comparison only.						
67.	<p>Management Direction: Develop cultural resources management plans for the former KEPA and each GSENM unit. These plans will assign cultural sites to use categories (such as public use, scientific, and traditional use), and management for the protection and interpretation of these sites. The criteria in Appendix J of the 2020 GSENM-KEPA Final EIS (Cultural Resources) will be used to assign cultural sites to appropriate classifications. Dance Hall Rock is assigned to the public use category. The cultural resource management plans will provide for the proper care and management of GSENM cultural resource objects.</p>	<p>Management Direction: Develop an implementation-level cultural resource management plan to help provide further guidance on resource- and site-specific strategies to ensure the protection of the cultural resources in place and in their original context. The criteria in Appendix D (Cultural Resources) will be used to assign cultural sites to appropriate classifications and guide management of those areas.</p>			<p>Management Direction: Develop cultural resources management plans for KEPA and each GSENM unit. These plans will assign cultural sites to use categories (such as public use, scientific, traditional use), and management for the protection and interpretation of these sites. The criteria in Appendix J of the 2020 GSENM-KEPA Final EIS (Cultural Resources) will be used to assign cultural sites to appropriate classifications. Dance Hall Rock is assigned to the public use category. The cultural resource management plans for GSENM will provide for the proper care and management of cultural resource monument objects. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	TRIBAL STEWARDSHIP				Not for analysis. For comparison only.	
68.	Goal: Recognize tribal and local county interests and work with tribes and counties to support uses of public lands, as appropriate.	Goal: Honor Tribal Nation's stewardship, interests, and uses of GSENM.			Goal: Recognize tribal and local county interests and work with Tribes and counties to support uses of public lands, as appropriate. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
69.	Objective: Develop and maintain working relationships with tribes having an interest in the area.	Objective: Establish a management approach in coordination with Tribal Nations that ensures continued Tribal Nation stewardship of GSENM resources.			Objective: Develop and maintain working relationships with Tribes having an interest in the area. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
70.	Objective: No similar objective.	Objective: Protect the integrity of cultural resources, sacred sites, traditional cultural landscapes, native plants, and other resources important to Tribal Nations.			Objective: No similar objective.	Objective: No similar objective.
71.	Objective: Consult with tribal governments regarding proposed land uses with the potential to affect resources identified as having tribal interests or concerns.	Objective: No similar objective.			Objective: Consult with tribal governments regarding proposed land uses with the potential to affect resources identified as having tribal interests or concerns. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
72.	Objective: Determine the types of resources of concern to tribes and local counties and consider tribal and county views when making land use allocations or decisions.	Objective: No similar objective.			Objective: Determine the types of resources of concern to Tribes and local counties and consider tribal and county views when making land use allocations or decisions. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
73.	Objective: Provide opportunities for traditional (such as Native American or other local heritage) uses of cultural resources, sacred sites, landscapes, and native plants.	Objective: No similar objective.			Objective: Provide opportunities for traditional (such as Native American or other local heritage) uses of cultural resources, sacred sites, landscapes, and native plants. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
74.	Management Direction: No similar management direction.	Management Direction: Avoid, reduce, and/or remove imminent and long-term threats to sacred sites, important landscapes, native plants, and other resources important to Tribal Nations.			Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	TRIBAL STEWARDSHIP				Not for analysis. For comparison only.	
75.	Management Direction: Allow Native American noncommercial traditional use of vegetation and forestland woodland products for the collection of herbs, medicines, traditional use items, or items necessary for traditional, religious, or ceremonial purposes without a permit.	Management Direction: Provide Tribal Nations access to cultural resources, sacred sites, and traditional cultural landscapes without a permit, if for noncommercial purposes and it is consistent with the protection of GSENM objects. With respect to Tribal Nations' use of GSENM, provide for casual collection of herbs, medicines, traditional use items, or items necessary for traditional, religious, or ceremonial purposes without a permit, where applicable by law and consistent with the protection of GSENM objects. Harvesting of forestry and woodland products requires a permit (see <i>Forestry and Woodland Products</i> section).			Management Direction: Allow Native American non-commercial traditional use of vegetation and forestland woodland products for the collection of herbs, medicines, traditional use items, or items necessary for traditional, religious, or ceremonial purposes without a permit. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
76.	Management Direction: No similar management direction.	Management Direction: Coordinate with Tribal Nations to determine how to appropriately educate the public about traditional histories, uses, practices, and sacred places.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
77.	Management Direction: Establish and maintain agreements with all Native American tribes interested in specific projects or areas on which they wish to consult.	Management Direction: In consultation with Tribal Nations, develop a Tribal Nation Co-Stewardship Implementation-Level Plan to provide for specific co-stewardship relationships between the BLM and Tribal Nations. This implementation level plan will address, but may not be limited to, addressing the following: <ul style="list-style-type: none"> • Cooperate in project-level planning. • Cooperate in program development (including education and interpretation about species, tribal uses, and other GSENM objects), resource protection, and public land access concerning GSENM. • Engage on an ongoing basis in joint dialogue, knowledge-sharing and learning programs for BLM managers and professional staff, tribal officials, and other appropriate parties to address critical resource management, tribal and agency program priorities, and a shared awareness of the tribal context of the landscape, including the need to protect both visible and sacred tribal uses and activities, as well as GSENM objects and other resources. • Regularly coordinate, consult, and engage on resource management priorities including project planning and joint management opportunities within GSENM. • Develop opportunities to engage tribal youth in the culture and traditions in GSENM, as well as the protection and management of GSENM to cultivate a shared understanding of GSENM's context and a shared stewardship for its resources. • Cooperatively seek additional partnerships, funds, and authorities to achieve shared tribal and federal land management goals. • Maintain the confidentiality of documents and deliberations to the extent legally permissible prior to the contents of such documents and deliberations becoming publicly available through official releases, such as the public release of any planning or NEPA documents, including drafts. • Take all reasonable measures to protect information regarding sacred sites, traditional ceremonies and other rituals from disclosure to prevent damage or desecration. • Explore opportunities for repatriating cultural resources and related data excavated or removed from federal lands. • Work collaboratively to ensure Tribal Nations have access to sacred sites and other areas of tribal importance in GSENM for cultural purposes. • Work collaboratively to develop a strategy for inventorying and monitoring the objects and values within GSENM. Within this strategy, identify how to obtain input from tribal members, in particular tribal elders, who cannot travel to remote sites. • Placename change recommendations for the U.S. Board of Geographic Names to better honor tribal stewardship of this landscape. • The BLM and Tribal Nations will work to develop timelines associated with discretionary action reviews based on tribal interest. 			Management Direction: Establish and maintain agreements with all Native American Tribes interested in specific projects or areas on which they wish to consult. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	TRIBAL STEWARDSHIP				Not for analysis. For comparison only.	
78.	<p>Management Direction: Establish continuing collaborative programs with local communities, organizations, local and state agencies, Native American communities, outfitters and guides, volunteers, and other interested parties. The purpose is to identify, inventory, document, monitor, and develop and implement plans for the restoration, stabilization, protection, and/or interpretation of appropriate sites. Continue the current Oral History Program in cooperation with local communities.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: Establish continuing collaborative programs with local communities, organizations, local and State agencies, Native American communities, outfitters and guides, volunteers, and other interested parties to identify, inventory, document, monitor, and develop and implement plans for the restoration, stabilization, protection, and/or interpretation of appropriate sites and resources. Continue the current Oral History Program in cooperation with local communities. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: The BLM will establish continuing collaborative programs with local communities, organizations, local and State agencies, Native American Indian communities, outfitters and guides, volunteers, and other interested parties. This will be done in order to identify, inventory, monitor, and develop and implement plans for the restoration, stabilization, protection, and/or interpretation of appropriate sites and resources within the Monument. The collaborative programs will include the continuation of the current Oral History Program in cooperation with local communities. The Oral History Program focuses on the collection of histories from local residents and people knowledgeable about the region. The BLM will use the information collected to create a better understanding of cultures and communities and will work to showcase the histories of the local communities as part of the “long and dignified history” of the Monument (2000 MMP).</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	PALEONTOLOGICAL RESOURCES AND GEOLOGY				Not for analysis. For comparison only.	
79.	Goal: Manage paleontological resources to protect them and make them accessible for appropriate research and public enjoyment.	Goal: Ensure the preservation and protection of paleontological and geological resources.			Goal: Manage paleontological resources in order to protect them and make them accessible to appropriate research and public enjoyment. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
80.	Objective: Continue to inventory paleontological resources and evaluate their significance for protection, conservation, research, or interpretation.	Objective: No similar objective (this is covered in a management action).			Objective: Continue to inventory for paleontological resources and evaluate their significance for protection, conservation, research, or interpretation. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The BLM will continue to inventory the Monument for paleontological resources and evaluate their potential for protection, conservation, research, or interpretation.
81.	Objective: Protect known paleontological resources from destruction or degradation. This also applies to materials from public lands located in museum collections. Manage uses to prevent unnecessary damage to paleontological resources.	Objective: Protect paleontological and geologic resources from destruction or degradation. Manage discretionary uses to prevent unnecessary damage to paleontological resources.			Objective: Protect known paleontological resources from destruction or degradation. This also applies to materials from public lands located in museum collections. (GSENM ROD 2020, KEPA ROD 2020) Manage uses to prevent unnecessary damage to paleontological resources. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Protect the abundant paleontological resources in the Monument from destruction or degradation. Manage uses to prevent damage to paleontological resources in the Monument.
82.	Management Direction: No similar management direction	Management Direction: Identify and protect paleontological and geological sites and specimens appropriate for public access.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
83.	Management Direction: Conduct proactive (non-compliance-driven) inventory of lands managed under the GSENM RMP (2020) for paleontological resources and evaluate their potential for protection, conservation, research, or interpretation. Areas with PFYC ratings of 4 or 5 or with potential conflicts with other resources or threats from other uses will be given priority over those areas with lower PFYC ratings or no known user conflicts/threats.	Management Direction: Proactively maintain an annual program of inventorying, monitoring, and, where appropriate, collecting and curation for paleontological and geological resources. Focus on areas and resources identified in Proclamation 10286 and other fossil areas with PFYC ratings of 4 and 5 and utilizing scientific principles and guidance.			Management Direction: Conduct proactive (non-compliance-driven) inventory of GSENM for paleontological resources and evaluate their potential for protection, conservation, research, or interpretation. Areas with PFYC ratings of 4 or 5 or with potential conflicts with other resources or threats from other uses will be given priority over those areas with lower PFYC ratings or no known user conflicts/threats. (GSENM ROD 2020)	Management Direction: A monitoring program will be used to assess management needs of sensitive sites and areas. All proposed projects will be required to include a paleontological site inventory, and appropriate strategies will be used to avoid sensitive sites, restrict access to the sensitive resource (that is, construct barriers), or as a last resort, excavate and curate the resource.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	PALEONTOLOGICAL RESOURCES AND GEOLOGY				Not for analysis. For comparison only.	
84.	Management Direction: No similar management direction.	Management Direction: No similar management direction (most of GSENM is ROW avoidance or exclusion; see <i>Lands and Realty</i>).		Management Direction: Manage PFYC 4 and 5 as ROW exclusion.	Management Direction: No similar management direction.	Management Direction: No similar management direction.
85.	Management Direction: Develop a Paleontological RMP for lands with high potential for scientifically significant fossils (that is, PFYC 4 and 5). The Paleontological RMP would include the following components: <ul style="list-style-type: none"> • Basic structure and organization of the paleontological resource program • Protocols for inventory, collection, and protection of paleontological resources • Protocols for managing paleontological sites by class, including the identification of scientific, educational, and recreational use opportunities. • Protocols for volunteer/citizen scientist involvement in paleontological resource management/research • Development of a consistent PFYC system for use throughout the planning area • Coordination with counties or municipalities on appropriate exhibits • Opportunities for local interpretation of paleontological resources • Onsite (at designated sites) or community-based interpretation for significant sites/specimens to create opportunities for public access and appreciation. 	Management Direction: Develop a paleontological resource implementation plan in coordination with academic institutions, interested stakeholders, and appropriate state and local government, including counties and municipalities, that includes, but is not limited to, the following components: <ul style="list-style-type: none"> • Development of a consistent PFYC system for use throughout the planning area • Basic structure and organization of the paleontological resource program • Protocols for inventory, collection, and protection of paleontological resources • Protocols for managing paleontological sites by class, including the identification of scientific, educational, and recreational use opportunities. • Protocols for volunteer/citizen scientist involvement in paleontological resource management/research • Develop a catalog of field locations needing baseline inventories where various impacts are adversely affecting resources. • Develop annual inventory, monitoring, and collection plans for paleontological resources in coordination with the relevant research communities. • Develop site security plans for threatened or vulnerable sites. • Onsite (at designated sites) or community-based interpretation for significant sites/specimens to create opportunities for public access and appreciation. • Protocol for monitoring trends and conditions of paleontological sites, including prioritization for scientifically important fossils and based on threats. • Collections Management Strategy including specimens in offsite museums 			Management Direction: Develop a Paleontological RMP for GSENM and certain KEPA lands with high potential for scientifically significant fossils (that is, PFYC 4 and 5). The Paleontological RMP would include the following components: <ul style="list-style-type: none"> • Basic structure and organization of the paleontological resource program • Protocols for inventory, collection, and protection of paleontological resources • Protocols for managing paleontological sites by class, including the identification of scientific, educational, and recreational use opportunities. • Protocols for volunteer/citizen scientist involvement in paleontological resource management/research • Development of a consistent PFYC system for use throughout the Planning Area • Coordination with counties or municipalities on appropriate exhibits • Opportunities for local interpretation of paleontological resources • Onsite (at designated sites) or community-based interpretation for significant sites/specimens to create opportunities for public access and appreciation. • Protocol for monitoring trends and conditions of paleontological sites, including prioritization for scientifically important fossils and based on threats. 	Management Direction: Public education and interpretation will be emphasized to improve visitor understanding of paleontological resources and to prevent damage. Collaborative partnerships with volunteers, universities, and other re-search institutions will be pursued to document, preserve, monitor or interpret sites consistent with the overall objective of protecting paleontological resources. Facilitate appropriate paleontological research to improve understanding of paleontological resources within

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	PALEONTOLOGICAL RESOURCES AND GEOLOGY				Not for analysis. For comparison only.	
85. (cont.)	<ul style="list-style-type: none"> • Protocol for monitoring trends and conditions of paleontological sites, including prioritization for scientifically important fossils and based on threats. • Collections Management Strategy including off-site specimens in museums. • Coordination with academic institutions, interested stakeholders, and appropriate state and local government, including counties and municipalities, in the development of the Paleontological RMP. 	(See above.)			<ul style="list-style-type: none"> • Collections Management Strategy including offsite specimens in museums. • Coordination with academic institutions, interested stakeholders, and appropriate State and local government, including counties and municipalities, in the development of the Paleontological RMP (GSENM ROD 2020, KEPA ROD 2020). 	(See above.)

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FISH AND WILDLIFE				Not for analysis. For comparison only.	
86.	<p>Goal: Manage the biological integrity of terrestrial and aquatic ecosystems to maintain and/or improve habitat and fish and wildlife populations, with emphasis on ecosystem health and overall biodiversity.</p>	<p>Goal: Manage the biological integrity of terrestrial and aquatic ecosystems for the benefit of native aquatic, avian, and terrestrial wildlife habitats and populations, with emphasis on ecosystem health, resiliency, and biodiversity.</p>			<p>Goal: Manage the biological integrity of terrestrial and aquatic ecosystems to maintain and/or improve habitat and fish and wildlife populations, with emphasis on ecosystem health and overall biodiversity. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Goal: Manage uses to prevent damage to fish and wildlife species and their habitats (2000 MMP).</p>
87.	<p>Objective: Maintain and/or improve and enhance aquatic and wildlife resources and provide biological diversity to support healthy ecosystems.</p> <p>Conserve habitat for migratory birds and emphasize management of migratory birds listed on the U.S. Department of the Interior, Fish and Wildlife Service's (USFWS) current list of Birds of Conservation Concern and the Partners-in-Flight priority species.</p> <p>Maintain and/or improve habitat quantity and quality (forage, water, cover, space, security, trophic level integrity, and biogeochemical processes) sufficient to sustain diverse wildlife populations. Also, meet objectives identified in coordination with the UDWR, USFWS, and other federal, state, and local agencies in managing special status species and their habitat.</p> <p>Maintain and/or improve aquatic stream habitat to support productive and diverse fisheries and other aquatic populations.</p>	<p>Objective: Maintain and restore aquatic, avian, and terrestrial wildlife habitat quality and quantity, including seasonal, migratory, and connectivity habitats, to provide for biologically diverse and healthy ecosystems to meet BLM Utah Rangeland Health Standards (Standard 3).</p>	<p>Objective: Maintain, enhance, and/or restore aquatic, avian, and terrestrial wildlife habitat quality and quantity, including seasonal, migratory, and connectivity habitats, to provide for biologically diverse and healthy ecosystems.</p>	<p>Objective: Maintain and/or improve and enhance aquatic and wildlife resources and provide biological diversity to support healthy ecosystems. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Conserve habitat for migratory birds and emphasize management of migratory birds listed on the USFWS's current list of Birds of Conservation Concern and the Partners-in-Flight priority species. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Maintain and/or improve habitat quantity and quality (forage, water, cover, space, security, trophic level integrity, and biogeochemical processes) sufficient to sustain diverse wildlife populations, meeting objectives identified in coordination with the UDWR, USFWS, and other federal, state, and local agencies in managing special status species and their habitat. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Maintain and/or improve aquatic stream habitat to support productive and diverse fisheries and other aquatic populations. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Objective: Work in conjunction with the UDWR in managing fish, wildlife, and other animals to achieve and maintain natural populations, population dynamics, and population distributions in a way that protects and enhances Monument resources (2000 MMP).</p> <p>The BLM will manage habitats for the recovery or re-establishment of native populations through collaborative planning with local, state and federal agencies, user groups, and interested organizations (2000 MMP).</p> <p>The BLM will place a priority on protecting riparian and water resources as they relate to fish and wildlife and will work cooperatively with the Forest Service to coordinate maintenance of fisheries and flows (2000 MMP).</p>	

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FISH AND WILDLIFE				Not for analysis. For comparison only.	
88.	Objective: Maintain and/or improve habitat connectivity and unrestricted wildlife movement between ecological areas to the maximum extent possible.	Objective: Incorporate state wildlife agency habitat management goals and associated actions related to big game winter and summer range and migration corridors, and migration corridors for birds, insects, and fish, with measurable outcomes, into ongoing wildlife management (such as maintenance of related infrastructure) and project-level planning.			Objective: Maintain and/or improve habitat connectivity and unrestricted wildlife movement between ecological areas to the maximum extent possible. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The BLM will preserve the integrity of wildlife corridors, migration routes and access to key forage, nesting, and spawning areas by limiting adverse impacts from development in the Monument (2000 MMP).
89.	Management Direction: No similar management direction.	Management Direction: Prohibit placement of new permanent structures or roads where they would reduce animal or plant population resiliency or inhibit big game migration on a long-term basis.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
90.	Management Direction: Design road crossings of waterbodies that support fish to allow for fish passage; exceptions may be considered.	Management Direction: Design waterway road crossings to provide aquatic species passage and floodplain connectivity as well as to allow for high flow events.			Management Direction: Design road crossings of waterbodies that support fish to allow for fish passage; exceptions may be considered. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
91.	Management Direction: Any proposal to use domestic sheep/goats as pack animals or for any other use would be considered per BLM Manual 1730 (or applicable guidance). A site-specific analysis of any proposal would be conducted to identify the level of risk to the health of wild sheep and determine whether the action can occur and still achieve effective separation between domestic sheep/goats and wild sheep.	Management Direction: Ensure that management provides for effective physical separation between domestic sheep/goats and desert bighorn sheep.	Management Direction: Prohibit domestic sheep or goats as the kind (species) of livestock on 10-year grazing permits. Domestic sheep and goats could be used, as appropriate, for vegetation management or scientific research purposes, if effective physical separation between domestic sheep/goats and wild sheep will be maintained. Domestic sheep and goats may only be used as pack animals outside of occupied desert bighorn sheep habitat.		Management Direction: Any proposal to use domestic sheep/goats as pack animals or for any other use would be considered per BLM Manual 1730 (or applicable guidance). A site-specific analysis of any proposal would be conducted to identify the level of risk to the health of wild sheep and determine whether the action can occur and still achieve effective separation between domestic sheep/goats and wild sheep. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No allotments will be converted from cows and horses to domestic sheep within at least a 9-mile buffer of bighorn sheep habitat, except where topographic features or other barriers prevent physical contact. This is in order to prevent the spread of disease from domestic sheep to desert bighorn sheep. Other BLM guidelines or policies in regard to domestic and wild stock interactions will also apply (2000 MMP).

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92.	<p>Management Direction: Manage habitats for the recovery or re-establishment of native, naturalized, or introduced fish and wildlife species in accordance with UDWR species management plans with goals and objectives set forth by UDWR.</p> <p>Allow maintenance of existing habitat treatments that benefit native, naturalized, or introduced fish and wildlife, as well as other resources and uses of BLM-managed land.</p> <p>Allow new habitat improvement treatments to benefit native, naturalized, or introduced fish and wildlife, as well as other resources and uses of BLM-administered land in accordance with current species-specific guidelines and local working group prescriptions.</p>	<p>Management Direction: Maintain and restore habitat through vegetation management or other actions (such as instream habitat improvement) to support sustainable populations of native aquatic, avian, and terrestrial wildlife species.</p>	<p>Management Direction: <u>Front, Passage, and Outback Areas:</u> Same as Alternative B.</p> <p><u>Primitive Area:</u> Same as Alternative D.</p>	<p>Management Direction: Maintain, enhance, and/or restore native habitat through vegetation management or other actions to support sustainable populations of native aquatic, avian, and terrestrial wildlife species, prioritizing natural processes and techniques (such as low-tech process-based restoration) over other methods.</p>	<p>Management Direction: Manage habitats for the recovery or re-establishment of native, naturalized, or introduced fish and wildlife species in accordance with UDWR species management plans with goals and objectives set forth by UDWR. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Allow maintenance of existing habitat treatments that benefit native, naturalized, or introduced fish and wildlife, as well as other resources and uses of BLM-administered land.</p> <p>Allow new habitat improvement treatments to benefit native, naturalized, or introduced fish and wildlife, as well as other resources and uses of BLM-administered land in accordance with current species-specific guidelines and local working group prescriptions. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Work cooperatively with the UDWR to reestablish populations of native species to historic ranges within the boundaries of the Monument, and to take needed actions to protect and enhance the habitat of these native species (MMP 2000).</p>
93.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Avoid adverse impacts on aquatic, avian, and terrestrial species habitat, connectivity, and movement. Where adverse impacts cannot be avoided, ensure project design features would reduce loss of native habitat, connectivity, and movement.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Manage habitats for the recovery or reestablishment of native populations (MMP 2000).</p>
94.	<p>Management Direction: Allow introduction, transplant, augmentation, and re-establishment of native and naturalized fish and wildlife species in cooperation and collaboration with UDWR, subject to current policy. Allow removal of unwanted nonnative wildlife species.</p>	<p>Management Direction: Foster self-sustaining populations of native aquatic, avian, and terrestrial species and associated ecosystems through augmentation, transplant, and reintroduction of native species. Nonnative species could be used in specific circumstances if they help meet identified objectives, they pose no threat to the greater ecosystem, and their use is consistent with the protection of GSENM objects.</p>			<p>Management Direction: Allow introduction, transplant, augmentation, and re-establishment of native and naturalized fish and wildlife species in cooperation and collaboration with UDWR, subject to current policy. Allow removal of unwanted nonnative wildlife species. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Work cooperatively with the UDWR to reestablish populations of native species to historic ranges within the boundaries of the Monument, and to take needed actions to protect and enhance the habitat of these native species (MMP 2000).</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FISH AND WILDLIFE					
	Not for analysis. For comparison only.					
95.	<p>Management Direction: Allow surface-disturbing activities, fence modification and maintenance, travel, and vegetation treatment in big-game crucial seasonal ranges, birthing habitats, and migration corridors on a basis consistent with other resource use restrictions and in accordance with the big game BMPs.</p> <ul style="list-style-type: none"> • Allow surface-disturbing activities in crucial desert bighorn sheep habitat subject to BMPs and mitigation as applicable. <p>Allow modifying (via smooth wire), removal (if no longer necessary), or seasonally adapting (seasonal laydown) fencing if proven to impede movement of big game through migration corridors.</p>	<p>Management Direction: Maintain and restore habitat connectivity and unrestricted native aquatic, avian, and terrestrial species movement between ecological areas, seasonal use areas, and other areas important for sustainable populations.</p> <p>Allow construction of aquatic species barriers if the benefit of nonnative species control and native species protection is greater than the loss in connectivity.</p>		<p>Management Direction: Maintain, enhance, and/or restore habitat connectivity and unrestricted native aquatic, avian, and terrestrial species movement between ecological areas, seasonal use areas, and other areas important for sustainable populations.</p> <p>Allow construction of aquatic species barriers if the benefit of nonnative species control and native species protection is greater than the loss in connectivity.</p>	<p>Management Direction: Allow surface-disturbing activities, fence modification and maintenance, travel, and vegetation treatment in big-game crucial seasonal ranges, birthing habitats, and migration corridors on a basis consistent with other resource use restrictions and in accordance with the big game BMPs.</p> <ul style="list-style-type: none"> • Allow surface-disturbing activities in crucial desert bighorn sheep habitat subject to BMPs and mitigation as applicable. <p>Allow modifying (via smooth wire), removal (if no longer necessary), or seasonally adapting (seasonal laydown) fencing if proven to impede movement of big game through migration corridors. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Preserve the integrity of wildlife corridors, migration routes, and access to key forage, nesting, and spawning areas by limiting adverse impacts from development in the monument (MMP 2000).</p>
96.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Allow new supplemental water developments for native terrestrial species. In WSAs, allow only if developments are designed in a manner that does not reduce wilderness character or that enhances the resources for which a WSA was designated.</p>	<p>Management Direction: <u>Front, Passage, and Outback Country Areas:</u> Allow new supplemental water developments for native terrestrial species if they are designed in a manner that is consistent with the protection of GSENM objects <u>Primitive Area:</u> Same as Alternative D.</p>	<p>Management Direction: Facilitate water availability for native terrestrial species to offset the effects of persistent drought and/or disperse native terrestrial species use to avoid disease outbreak, through the maintenance, restoration, and/or enhancement of natural waterways and wetlands.</p> <p>Only allow temporary (that is, no longer than 6 months) supplemental water developments for native terrestrial species (such as guzzlers and drinkers).</p>	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Water developments may be constructed for wildlife purposes if consistent with the overall objectives for fish and wildlife and with the water development policy discussed in the Water section (2000 MMP).</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
97.	Goal: Maintain, protect, enhance, and recover habitats and populations of federally listed threatened, endangered, proposed, or candidate plant, animal, or fish species, and actively promote recovery to the point that provisions of the Endangered Species Act (ESA) are no longer required.	Goal: Ensure that special status species (BLM-Utah sensitive, federally listed threatened, endangered, proposed, or candidate plant, animal, or fish species) are recovering and support sustainable populations and the diversity of habitats in GSENM.			Goal: Maintain, protect, enhance, and recover habitats and populations of federally listed threatened, endangered, proposed, or candidate plant, animal, or fish species, and actively promote recovery to the point that provisions of the ESA are no longer required. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
98.	Objective: No similar objective.	Objective: Protect and recover special status species (BLM-Utah sensitive, federally listed threatened, endangered, proposed, or candidate plant, animal, or fish species) habitats and populations. Actively promote recovery to the point that provisions of the ESA are no longer required or to avoid a need to list them under the ESA.			Objective: No similar objective.	Objective: The BLM will continue to ensure that authorized actions do not jeopardize the continued existence of any special status animal species or result in the destruction or adverse modification of critical habitats (2000 MMP).
99.	Objective: Develop and implement conservation measures to minimize long-term habitat fragmentation and maintain habitat connectivity through avoidance and site-specific reclamation to provide the habitat quality and quantity to meet ecological requirements and support a natural diversity of species.	Objective: No similar objective.			Objective: Develop and implement conservation measures to minimize long-term habitat fragmentation and maintain habitat connectivity through avoidance and site-specific reclamation in order to provide the habitat quality and quantity to meet ecological requirements and support a natural diversity of species. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
100.	Management Direction: No similar management direction.	Management Direction: Ensure that all management actions support the protection of special status species and their habitats. Avoid adverse impacts on special status species habitat, connectivity, and movement. Where adverse effects cannot be avoided, ensure adverse impacts are short-term, temporary, or would lead to overall species benefit in the long-term.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
101.	Management Direction: No similar management direction.	Management Direction: Maintain and restore native habitat through vegetation management or other actions to support sustainable populations of special status species.	Management Direction: <u>Front, Passage, and Outback Areas:</u> Same as Alternative B. <u>Primitive Area:</u> Same as Alternative D.	Management Direction: Maintain, enhance, and/or restore native habitat through vegetation management or other actions to support sustainable populations of special status species, prioritizing natural processes and techniques over other methods.	Management Direction: No similar management direction.	Management Direction: Vegetation Restoration methods (as described in the Vegetation section) will not be allowed in areas where special status species roost or nest (unless consultation with USFWS indicates no effect or a beneficial effect to species).

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
102.	Management Direction: No similar management direction.	Management Direction: Maintain and restore habitat connectivity and unrestricted special status species movement between ecological areas, seasonal use areas, and other areas important for sustainable populations. Allow construction of aquatic organism barriers if the benefit of nonnative species control and special status species protection is greater than the loss in connectivity.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
103.	Management Direction: If recreation activities (such as hiking, camping, backpacking, rappelling, rock climbing, and canyoneering) are determined to disrupt or result in abandonment of known roost or nest sites for special status bird species, reduce impacts through visitor allocations, group size restrictions, or other measures. Apply visitor allocations and group size restrictions in accordance with recreation decisions.				Management Direction: If recreation activities (such as hiking, camping, backpacking, rappelling, rock climbing, canyoneering) are determined to disrupt or result in abandonment of known roost or nest sites for special status bird species, reduce impacts through visitor allocations, group size restrictions, or other measures. Apply visitor allocations and group size restrictions in accordance with Recreation decisions. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: If recreation activities (such as hiking, camping, backpacking) are determined to impact known nest sites, allocations and/or group size restrictions or other measures will be implemented to reduce disturbance. If allocations and group size limits are implemented, they will be developed in accordance with the Group Size and Recreation Allocation provisions in this Plan.
104.	Management Direction: Allow surface-disturbing activities within habitat for special status species using appropriate buffers and seasons.	Management Direction: No similar management direction.			Management Direction: Allow surface-disturbing activities within habitat for special status species using appropriate buffers and seasons. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Surface disturbing research activities will generally not be allowed in threatened or endangered species habitat.
105.	Management Direction: Avoid new ROWs and communication sites in special status species habitat and applicable buffers where suitable alternatives exist.	Management Direction: Manage designated critical habitat that contain the physical and biological features necessary for listed species as ROW avoidance, except in areas identified as open for ROW location (see <i>Lands and Realty</i>).		Management Direction: Manage designated critical habitat as ROW exclusion, except in areas identified as open for ROW location (see <i>Lands and Realty</i>).	Management Direction: Avoid new ROWs and communication sites in special status species habitat and applicable buffers where suitable alternatives exist. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Communication sites, utility ROWs, and road ROWs will not be permitted in known special status species populations. As permits are granted for these sites and ROWs, surveys will be completed to determine the presence of special status species in the area. If they are found, these activities will be moved to another location.

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	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
106.	Management Direction: Establish seasonal closures for rock climbing in occupied nesting areas for California condor, golden eagle, Mexican spotted owl, and peregrine falcon during periods of occupancy.	Management Direction: Establish seasonal closures for habitat altering or other activities that are known to cause disturbances to nesting raptors in occupied nesting areas for California condor, golden eagle, Mexican spotted owl, and peregrine falcon during periods of occupancy.			Management Direction: Establish seasonal closures for rock climbing in occupied nesting areas for California condor, golden eagle, Mexican spotted owl, and peregrine falcon during periods of occupancy. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Establish criteria for designation of rock-climbing areas. These criteria will not allow climbing areas to be designated in known peregrine falcon or Mexican spotted owl nest sites. If new sites are identified as occupied for nesting in areas designated for climbing, seasonal closures will be established in those areas to ensure that disturbance of nesting activities does not occur.
107.	Management Direction: Allow surface use or disruptive activities within 0.5 miles of occupied California condor roosts or 1 mile of occupied nests only if (1) the activity is consistent and compatible with protection, maintenance, or enhancement of the habitat and populations or (2) the activity is relocated or redesigned to eliminate or reduce detrimental impacts.	Management Direction: Protect California condors by avoiding surface use or activities that are known to cause disturbances to nesting raptors within 0.5 miles of occupied California condor roosts or 1 mile of occupied nests.		Management Direction: Protect California condors by prohibiting surface use or disruptive activities within 0.5 miles of occupied California condor roosts or 1 mile of occupied nests.	Management Direction: Allow surface use or disruptive activities within 0.5 miles of occupied California condor roosts or 1 mile of occupied nests only if (1) the activity is consistent and compatible with protection, maintenance, or enhancement of the habitat and populations, or (2) the activity is relocated or redesigned to eliminate or reduce detrimental impacts. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Although Section 7 consultation is not required for this species, the USFWS and the BLM agree that it is appropriate and desirable to discuss this species. Efforts will be made to protect potential habitat for this species and to limit activities which may be detrimental to their existence in cooperation with the counties and the USFWS.
108.	Management Direction: Allow development and maintenance of recreation and administrative facilities in Mexican spotted owl protected activity centers outside of the breeding season if (1) the activity is consistent and compatible with protection, maintenance, or enhancement of the habitat and populations or (2) the activity is relocated or redesigned to eliminate or reduce detrimental impacts.	Management Direction: Development and maintenance of recreation and administrative facilities may be authorized in Mexican spotted owl protected activity centers outside of the breeding season if (1) the activity is consistent and compatible with protection, maintenance, or enhancement of the habitat and populations or (2) the activity is relocated or redesigned to eliminate or reduce detrimental impacts.	Management Direction: <u>Front Country and Passage Areas:</u> Same as Alternative B. <u>Outback and Primitive Areas:</u> Same as Alternative D.	Management Direction: Prohibit new built-infrastructure or facilities in Mexican spotted owl protected activity centers.	Management Direction: Allow development and maintenance of recreation and administrative facilities in Mexican spotted owl protected activity centers outside of the breeding season if (1) the activity is consistent and compatible with protection, maintenance, or enhancement of the habitat and populations, or (2) the activity is relocated or redesigned to eliminate or reduce detrimental impacts. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

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	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
109.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Groups sizes are limited to 12 and overnight camping is prohibited in Mexican spotted owl protected activity centers during the breeding/nesting season (March 1 to August 31).</p> <p>Canyoneering or rappelling within protected activity centers during the breeding/nesting season (March 1 to August 31) requires that participants stay within the canyon bottom and not enter or exit the canyon via canyon walls or other areas that could possibly disrupt breeding/nesting MSO.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Spotted owls and their habitat within the Monument will be protected from impacts which might contribute to their decline and actions which promote recovery and conservation will be encouraged (2000 MMP).</p> <p>The BLM will designate protected activity centers in accordance with the recovery plan. Activities such as recreational use in these protected areas may be limited (as described in SSA-18) to help protect this species (2000 MMP).</p> <p>Trail construction will generally be limited to the front country and passage zones. Project level assessments and consultation with the USFWS will be completed before construction of any trails that are in close proximity to owl nest sites. Designated primitive camping areas, picnic areas, and trailheads will not be located within 1/2 mile of known spotted owl nesting, unless consultation with USFWS determines that impacts to nesting birds will not occur. This 1/2-mile buffer is recommended in the "Utah Field Guide for Raptor Protection from Human and Land Use Disturbances" (USFWS 1999) (2000 MMP).</p> <p>Criteria for designation of climbing areas will be established for the Monument. These criteria will not allow climbing areas to be designated in known Mexican spotted owl nest sites. If new nest sites are identified in areas designated for climbing, seasonal closures will be established in those areas to assure that disturbance of nesting activities does not occur.</p>

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	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
110.	<p>Management Direction: Allow surface-disturbing activities within occupied breeding habitat between June 1 and August 31 for western yellow-billed cuckoo and between April 15 and August 15 for southwestern willow flycatcher if after site-specific analysis and consultation with the USFWS it is determined that the activity would not adversely affect either the birds or their habitat.</p>	<p>Management Direction: Protect western yellow-billed cuckoo and southwestern willow flycatcher by avoiding habitat altering activities within occupied habitat during the primary breeding/nesting season (April 1 to July 1).</p>		<p>Management Direction: Protect western yellow-billed cuckoo and southwestern willow flycatcher by prohibiting habitat altering activities within occupied habitat during the primary breeding/nesting season (April 1 to July 1).</p>	<p>Management Direction: Allow surface-disturbing activities within occupied breeding habitat between June 1 and August 31 for western yellow-billed cuckoo and between April 15 and August 15 for southwestern willow flycatcher if after site-specific analysis and consultation with the USFWS it is determined that the activity would not adversely affect either the birds or their habitat. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: A comprehensive inventory for southwestern willow flycatcher populations in the Monument was begun in 1999. This is a multi-year project that will look at occurrence of southwestern willow flycatchers, current habitat, and habitat that has potential if modifications are made. This inventory will help to identify some of the impacts that are occurring in the area, which will help the BLM determine when and where limits on activities (such as recreational use) need to be implemented to protect the southwestern willow flycatcher.</p>
111.	<p>Management Direction: Prohibit fuelwood cutting in habitat for federally listed special status plant species. Allow fuelwood cutting in habitat for BLM sensitive plant with appropriate conservation measures to mitigate impacts as determined during site-specific assessments of proposed projects.</p>	<p>Management Direction: Allow vegetation management and noncommercial fuelwood harvest by permit with seasonal or breeding restrictions if it protects, restores, and/or enhances habitat for special status species.</p>			<p>Management Direction: Prohibit fuelwood cutting in habitat for federally listed special status plant species. Allow fuelwood cutting in habitat for BLM sensitive plant with appropriate conservation measures to mitigate impacts as determined during site-specific assessments of proposed projects. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Future fuelwood cutting areas will not be designated in listed plant populations (see the Forestry Products section for related decisions).</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
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112.	<p>Management Direction: Prohibit surface-disturbing activities in federally listed plant species habitat unless (1) the activity enhances scientific understanding of the species and (2) appropriate approvals and permits are obtained from the BLM and USFWS.</p>	<p>Management Direction: Avoid discretionary activities in special status species habitat that would adversely impact those species, unless the activity is designed to and would protect and restore the habitat.</p>		<p>Management Direction: Prohibit discretionary activities in special status species habitat that would adversely impact those species, unless the activity is designed to and would protect, restore, and/or enhance the habitat.</p>	<p>Management Direction: Prohibit surface-disturbing activities in federally listed plant species habitat unless (1) the activity enhances scientific understanding of the species and (2) appropriate approvals and permits are obtained from the BLM and USFWS. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Surface disturbing research activities will generally not be allowed in threatened or endangered plant species habitat. All scientific research projects in close proximity to listed species populations or habitat will be evaluated by Monument biologists, the USFWS, and appropriate experts prior to initiation to determine impacts to these populations or habitat. Any research project which may have an effect on populations of listed species will be coordinated with the USFWS and appropriate permits and Section 7 consultation will be completed as determined necessary. Projects which provide new information and understanding of listed species, their populations and/or their habitat, may be allowed after approval by the BLM and the review and issuance of permits by the USFWS. All projects will be evaluated on a case-by-case basis.</p>
113.	<p>Management Direction: Prohibit reseeding or surface-disturbing restoration activities after fires in known special status plant species habitat. For federally listed species, reseeding or surface-disturbing restoration activities after fires would be prohibited unless consultation with the USFWS indicates these measures are necessary for the protection and/or recovery of listed species. (GSENM ROD 2020)</p> <p>Allow reseeding or surface-disturbing restoration activities after fires in known special status plant species habitat if determined acceptable through consultation with the USFWS. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction</p>			<p>Management Direction: In the former GSENM boundary: Prohibit reseeding or surface-disturbing restoration activities after fires in known special status plant species habitat unless consultation with the USFWS indicates these measures are necessary for the protection and/or recovery of listed species. (GSENM ROD 2020)</p> <p>In the former KEPA boundary: Allow reseeding or surface-disturbing restoration activities after fires in known special status plant species habitat if determined acceptable through consultation with the USFWS. (KEPA ROD 2020)</p>	<p>Management Direction: Prohibit reseeding or surface-disturbing restoration activities after fires in areas with special status plant species. Natural diversity and vegetation structure will provide adequate regeneration.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
114.	<p>Management Direction: Prohibit prescribed fires in known special status plant species habitat. For federally listed species, prescribed fires would be prohibited unless consultation with the USFWS indicates that fire is necessary for the protection and/or recovery of listed species. (GSENM ROD 2020)</p> <p>Allow prescribed fires in known special status plant species habitat if determined acceptable through consultation with the USFWS. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: In the former GSENM boundary: Prohibit prescribed fires in known special status plant species habitat unless consultation with the USFWS indicates that fire is necessary for the protection and/or recovery of listed species. (GSENM ROD 2020)</p> <p>In the former KEPA boundary: Allow prescribed fires in known special status plant species habitat if determined acceptable through consultation with the USFWS. (KEPA ROD 2020)</p>	<p>Management Direction: Prohibit management-ignited fires in areas with special status plant species unless consultation with USFWS indicates that fire is necessary for the protection and/or recovery of listed species.</p>
115.	<p>Management Direction: Avoid expansion or development of new trails, parking areas, or other recreation facilities in habitat for federally listed plant species. (GSENM ROD 2020)</p> <p>Allow expansion or development of new trails, parking areas, or other recreation facilities in habitat for federally listed plant species if determined acceptable through consultation with the USFWS. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction</p>	<p>Management Direction: No similar management direction</p>	<p>Management Direction: No similar management direction</p>	<p>Management Direction: In the former GSENM boundary: Avoid expansion or development of new trails, parking areas, or other recreation facilities in habitat for federally listed plant species. (GSENM ROD 2020)</p> <p>In the former KEPA boundary: Allow expansion or development of new trails, parking areas, or other recreation facilities in habitat for federally listed plant species if determined acceptable through consultation with the USFWS. (KEPA ROD 2020)</p>	<p>Management Direction: Prohibit trails, parking areas, or other recreation facilities in any federally listed plant species population.</p>
116.	<p>Management Direction: Apply treatments to control outbreaks or establishment of noxious weed species in all areas (including special status species plants) in coordination with local cooperative weed management partnership.</p>	<p>Management Direction: Apply treatments to control outbreaks or establishment of noxious weed species in all areas (including special status species as long as appropriate mitigation measures are used to protect those species).</p>			<p>Management Direction: Apply treatments to control outbreaks or establishment of noxious weed species in all areas (including special status species plants) in coordination with local cooperative weed management partnership. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Areas with threatened or endangered plants will be targeted for noxious weed control activities as a first priority. BLM employees or contractors with appropriate certification will be responsible for use of chemicals in noxious weed removal efforts and will take precautions to prevent possible effects to non-target species.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
117.	Management Direction: No similar management direction.	Management Direction: Prohibit the use of chemical substances that may affect the Colorado pikeminnow or the razorback sucker downstream habitat.			Management Direction: No similar management direction.	Management Direction: Use of chemical substances that may affect the Colorado pikeminnow or the razorback sucker downstream habitat may not be used.
118.	Management Direction: Avoid surface-disturbing activities within 330 feet or habitat-fragmenting activities within 660 feet of potential, suitable, and occupied special status plant habitat. Allow surface-disturbing activities within 330 feet or habitat-fragmenting activities within 660 feet of potential, suitable, and occupied special status plant habitat only if (1) the activity is consistent and compatible with protection, maintenance, or enhancement of the habitat and populations as outlined in recovery and conservation plans and when such actions would not lead to the need to list the plant, or (2) the activity is relocated or redesigned to eliminate or reduce detrimental impacts to acceptable limits. (GSENM ROD 2020) Allow surface-disturbing activities in occupied special status plant habitat with appropriate mitigation or in occupied listed species habitat after consultation with the USFWS during site-specific permitting. (KEPA ROD 2020)	Management Direction: No similar management direction.			Management Direction: In the former GSENM boundary: Avoid surface-disturbing activities within 330 feet or habitat-fragmenting activities within 660 feet of potential, suitable, and occupied species status plant habitat. Allow surface-disturbing activities within 330 feet or habitat-fragmenting activities within 660 feet of potential, suitable, and occupied special status plant habitat only if (1) the activity is consistent and compatible with protection, maintenance, or enhancement of the habitat and populations as outlined in recovery and conservation plans and when such actions would not lead to the need to list the plant, or (2) the activity is relocated or redesigned to eliminate or reduce detrimental impacts to acceptable limits. (GSENM ROD 2020) In the former KEPA boundary: Allow surface-disturbing activities in occupied special status plant habitat with appropriate mitigation or in occupied listed species habitat after consultation with the USFWS during site-specific permitting. (KEPA ROD 2020)	Management Direction: Surface disturbing research activities will generally not be allowed in threatened or endangered plant species habitat. All scientific research projects in close proximity to listed species populations or habitat will be evaluated by Monument biologists, the USFWS, and appropriate experts prior to initiation to determine impacts to these populations or habitat. Any research project which may have an effect on populations of listed species will be coordinated with the USFWS and appropriate permits and Section 7 consultation will be completed as determined necessary. Projects which provide new information and understanding of listed species, their populations and/or their habitat, may be allowed after approval by the BLM and the review and issuance of permits by the USFWS. All projects will be evaluated on a case-by-case basis.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SPECIAL STATUS SPECIES				Not for analysis. For comparison only.	
119.	<p>Management Direction: Avoid surface-disturbing activities within 330 feet of special status fish species habitat. Allow surface-disturbing activities within 330 feet of special status fish species habitat only if (1) impacts from the proposed action can be adequately mitigated, or (2) the action will benefit the species and/or habitat, and (3) after a site-specific analysis and consultation with the USFWS as appropriate.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: Avoid surface-disturbing activities within 330 feet of special status fish species habitat. Allow surface-disturbing activities within 330 feet of special status fish species habitat only if (1) impacts from the proposed action can be adequately mitigated, or (2) the action will benefit the species and/or habitat, and (3) after a site-specific analysis and consultation with the USFWS as appropriate. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VISUAL RESOURCES				Not for analysis. For comparison only.	
120.	Goal: Manage uses to protect and maintain the quality of the scenic values.	Goal: Protect the quality of scenic values.			Goal: Manage uses to protect and maintain the quality of the scenic values. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
121.	Goal: Increase public awareness and appreciation of and engagement with scenic resources.	Goal: No similar goal.			Goal: Increase public awareness and appreciation of and engagement with scenic, night sky, and natural soundscape resources. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
122.	Objective: Manage lands according to the assigned VRM Class objective: <ul style="list-style-type: none"> VRM Class I – Preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. VRM Class II – Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but they should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. VRM Class III – Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but they should not 	Objective: Manage lands according to the assigned VRM Class objective: <ul style="list-style-type: none"> VRM Class I – Preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. VRM Class II – Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but they should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. VRM Class III – Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but they should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. 	Objective: Manage lands according to the assigned VRM Class objective: <ul style="list-style-type: none"> VRM Class I – Preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. VRM Class II – Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but they should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. 	Objective: Assign one of the following VRM Objectives to all lands within the Planning Area to allow for a range of visual value protection and resource use (GSENM ROD 2020, KEPA ROD 2020): <ul style="list-style-type: none"> VRM Class I – Preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. VRM Class II – Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but they should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. VRM Class III – Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but they should not dominate the view of the casual observer. Changes 	Objective: The VRM class objectives are as follows: <ul style="list-style-type: none"> Class II: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the landscape. <p>If areas are designated as Wilderness or designated a wild section of a National Wild and Scenic River, they will be reassigned to VRM Class I.</p>	

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VISUAL RESOURCES				Not for analysis. For comparison only.	
122. (cont.)	<p>dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.</p> <ul style="list-style-type: none"> VRM Class IV – Provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. 	(See above.)		(See above.)	<p>should repeat the basic elements found in the predominant natural features of the characteristic landscape.</p> <ul style="list-style-type: none"> VRM Class IV – Provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. 	(See above.)

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VISUAL RESOURCES				Not for analysis. For comparison only.	
123.	<p>Allocation: Allocate GSENM to the following VRM Classes:</p> <ul style="list-style-type: none"> • VRM Class I: 881,100 acres • VRM Class II: 422,300 acres • VRM Class III: 346,500 acres • VRM Class IV: 215,700 acres 	<p>Allocation: Allocate GSENM to the following VRM Classes:</p> <ul style="list-style-type: none"> • VRM Class I (955,000 acres) <ul style="list-style-type: none"> ○ WSAs ○ Wild WSR suitable segments (including a 0.5-mile corridor) ○ Lands with wilderness characteristics managed to protect those characteristics • VRM Class II (558,800 acres) <ul style="list-style-type: none"> ○ Areas inventoried as Scenic Quality A (except for the congressionally designated utility corridor along U.S. Highway 89) ○ Willis Creek ACEC ○ along designated Scenic Routes within Visual Resource Inventory foreground and middle ground distance zone ○ OSNHT high potential segment (Box of Paria) • VRM Class III (351,800 acres) <ul style="list-style-type: none"> ○ Congressionally designated utility corridor along U.S. Highway 89 (Public Law 105-355) ○ All lands not managed as VRM Class I or II 	<p>Allocation: Allocate GSENM to the following VRM Classes:</p> <ul style="list-style-type: none"> • VRM Class I (1,072,500 acres) <ul style="list-style-type: none"> ○ WSAs ○ Wild WSR suitable segments (including a 0.5-mile corridor) ○ Lands with wilderness characteristics in the primitive area • VRM Class II (645,400 acres) <ul style="list-style-type: none"> ○ Areas inventoried Scenic Quality A ○ All lands with wilderness characteristics in the passage and outback areas ○ Along designated Scenic Routes within Visual Resource Inventory foreground and middle ground distance zone ○ OSNHT • VRM Class III (147,700 acres) <ul style="list-style-type: none"> ○ All lands not managed as VRM Class I or II 	<p>Allocation: Allocate GSENM to the following VRM Classes:</p> <ul style="list-style-type: none"> • VRM Class I (1,440,700 acres) <ul style="list-style-type: none"> ○ WSAs ○ Wild WSR suitable segments (including at 0.5-mile corridor) ○ Lands with wilderness characteristics managed to protect those characteristics • VRM Class II (424,900 acres) <ul style="list-style-type: none"> ○ All other lands not managed as VRM Class I 	<p>Allocation: Allocate the former GSENM and KEPA to the following VRM Classes:</p> <ul style="list-style-type: none"> • VRM Class I: 881,100 acres • VRM Class II: 422,300 acres • VRM Class III: 346,500 acres • VRM Class IV: 215,700 acres (GSENM ROD 2020, KEPA ROD 2020) 	<p>Allocation: Utilizing the results of the visual resource inventory and other resource allocation considerations, 68 percent of the lands within the Monument will be assigned to VRM Class II and 32 percent of the lands within the Monument will be assigned to VRM Class III.</p>
124.	<p>Management Direction: To the extent practicable and as the opportunity arises, bring existing visual contrasts remaining from past land uses into VRM class conformance.</p>	<p>Management Direction: Reduce existing visual contrasts from past land uses to the extent practicable, through appropriate mitigation measures.</p>	<p>Management Direction: <u>Front Country and Passage Areas:</u> Same as Alternative B.</p> <p><u>Outback and Primitive Areas:</u> Same as Alternative D.</p>	<p>Management Direction: Bring existing visual contrasts from past land uses/projects/activities to the extent practicable, into VRM class conformance.</p>	<p>Management Direction: To the extent practicable and as the opportunity arises, bring existing visual contrasts remaining from past land uses into VRM class conformance. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: The VRM classes acknowledge existing visual contrasts. Existing facilities or visual contrasts will be brought into VRM class conformance to the extent practicable when the need or opportunity arises (that is, ROW renewals, mineral material site closures, abandoned mine rehabilitation).</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	VISUAL RESOURCES				Not for analysis. For comparison only.	
125.	<p>Management Direction: Allow temporary projects, such as research projects and meteorological monitoring stations, to exceed VRM objectives, if the project terminates within 3 years of initiation. Rehabilitation will be ongoing throughout project implementation if possible or begin at the end of the 3-year period. During the temporary project, the BLM Authorized Officer may require phased mitigation to better conform with VRM objectives.</p>	<p>Management Direction: The BLM Authorized Officer may allow temporary projects, such as research projects, to exceed VRM standards in Class II and III areas if the project terminates within 2 years of initiation. Rehabilitation will begin at the end of the 2-year period. During the temporary project, the Manager may require phased mitigation to better conform with prescribed VRM objectives.</p>			<p>Management Direction: Allow temporary projects, such as research projects and meteorological monitoring stations, to exceed VRM objectives, if the project terminates within 3 years of initiation. Rehabilitation will be ongoing throughout project implementation if possible or begin at the end of the 3-year period. During the temporary project, the authorized officer may require phased mitigation to better conform with VRM objectives. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: The Monument Manager may allow temporary projects, such as research projects, to exceed VRM standards in Class II and III areas if the project terminates within 2 years of initiation. Rehabilitation will begin at the end of the 2-year period. During the temporary project, the Manager may require phased mitigation to better conform with prescribed VRM standards.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	NIGHT SKIES				Not for analysis. For comparison only.	
126.	Goal: Manage uses to protect the quality of night sky resources.	Goal: Protect the quality of the dark night skies.			Goal: No similar goal.	Goal: No similar goal.
127.	Goal: Increase public awareness and appreciation of and engagement with night sky resources.	Goal: No similar goal.			Goal: Increase public awareness and appreciation of and engagement with scenic, night sky, and natural soundscape resources. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
128.	Objective: Inventory and monitor night skies and natural soundscapes in partnership with local communities, universities, other agencies, and stakeholders.	Objective: Manage outdoor lighting fixtures to protect the quality of dark night skies and other GSENM objects.			Objective: Inventory and monitor night skies and natural soundscapes in partnership with local communities, universities, other agencies, and stakeholders. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
129.	Management Direction: Implement BMPs in coordination with stakeholders to eliminate or minimize light pollution. Protect night sky vistas through implementation of BMPs and coordination with local communities and stakeholders.	Management Direction: Allow outdoor lighting fixtures for public health and safety only, adhering to the BMPs identified in Appendix C.	Management Direction: Allow outdoor lighting fixtures for public health and safety only, adhering to the BMPs identified in Appendix C. Where outdoor lighting fixtures are needed for public health and safety, remove, replace, or retrofit existing outdoor lighting fixtures where possible.	Management Direction: Allow outdoor lighting fixtures for public health safety only, adhering to the BMPs identified in Appendix C. Where possible, remove, replace, or retrofit existing exterior artificial light fixtures to meet BMPs.	Management Direction: Implement BMPs in coordination with stakeholders to eliminate or minimize light pollution. (GSENM ROD 2020, KEPA ROD 2020) Protect night sky vistas through implementation of BMPs and coordination with local communities and stakeholders. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: The BLM will seek to prevent light pollution within the Monument. No actions will be proposed within the Monument that will contribute to light pollution. The BLM will also work closely with the surrounding communities to minimize light pollution. Strobe lights will not be allowed at any communication site. Other methods will be used to meet aircraft safety requirements.
130.	Management Direction: No similar management direction.	Management Direction: Seek International Dark Sky Place status.			Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	NATURAL SOUNDSCAPES				Not for analysis. For comparison only.	
131.	Goal: Manage uses to protect the quality of natural soundscape resources.	Goal: Protect the quality of natural soundscapes.			Goal: Manage uses to protect the quality of night sky and natural soundscape resources. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
132.	Goal: Increase public awareness and appreciation of and engagement with natural soundscape resources.	Goal: No similar goal.			Goal: Increase public awareness and appreciation of and engagement with scenic, night sky, and natural soundscape resources. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
133.	Objective: Inventory and monitor night skies and natural soundscapes in partnership with local communities, universities, other agencies, and stakeholders.	Objective: Manage uses to protect the natural quiet associated with GSENM's soundscapes.			Objective: Inventory and monitor night skies and natural soundscapes in partnership with local communities, universities, other agencies, and stakeholders.	Objective: No similar objective.
134.	Management Direction: Develop a natural soundscape management plan.	Management Direction: No similar management direction.			Management Direction: Develop a natural soundscape management plan. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Studies on the effects of noise utilizing both visitor surveys and sound measuring instruments will be completed to determine what the noise baseline is for various areas within the Monument. Studies will be coordinated for areas that border adjacent National Parks.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	NATURAL SOUNDSCAPES				Not for analysis. For comparison only.	
135.	Management Direction: No similar management direction.	Management Direction: Require sound attenuation features for any facilities that generate noise to keep short-term anthropogenic noise below 75 decibels on the A-weighted scale (dBA) and long-term anthropogenic noise below 55 dBA (observed L50 sound level) at no more than 50 feet from the source. Prohibit noise-generating facilities in WSAs, lands with wilderness characteristics managed to protect those characteristics, RNAs (ACECs), and ACECs.	Management Direction: <u>Front Country Area:</u> Require sound attenuation features for any facilities that generate noise to keep short-term anthropogenic noise below 75 dBA and long-term anthropogenic noise below 55 dBA (observed L50 sound level) at no more than 50 feet from the source. <u>Passage and Outback Areas:</u> Require sound attenuation features for any facilities that generate noise to keep noise below 10 dBA above the L90 measured background sound level at no more than 50 feet from the source. <u>Primitive Area:</u> No noise-generating facilities. At all existing facilities: Retrofit existing facilities that generate sound to reduce sound generated below area thresholds to the extent possible.	Management Direction: No noise-generating facilities outside of developed campgrounds. Retrofit existing facilities that generate sound to reduce sound generated below 10 dBA above the L90 measured background sound level at no more than 50 feet from the source.	Management Direction: No similar management direction.	Management Direction: No similar management direction.
136.	Management Direction: No similar management direction.	Management Direction: Establish quiet hours to protect natural quiet at campgrounds, designated camping locations, and other locations, as warranted.			Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FIRE MANAGEMENT				Not for analysis. For comparison only.	
137.	Goal: Protect life, property, and resource values by responding to wildland fires based on ecological, social, and legal consequences of the fire and the circumstances under which it occurs.	Goal: Protect resource values by responding to wildland fires based on ecological importance of fire as a natural disturbance regime, while protecting life and property.			Goal: Protect life, property, and resource values by responding to wildland fires based on ecological, social, and legal consequences of the fire and the circumstances under which it occurs. (GSENM ROD 2020, KEPA ROD 2020)	Goal: Some full suppression zones occur within the Monument, found in areas where protection of structures and property are a concern. Protection of other resources is fully integrated into the fire management strategies for all of the zones in southern Utah and northern Arizona.
138.	Goal: No similar goal.	Goal: Proactively maintain and restore resistant and/or resilient native ecosystems.	Goal: Proactively maintain, restore and/or enhance resistant and/or resilient native ecosystems.		Goal: No similar goal.	Goal: No similar goal
139.	Objective: Allow natural caused wildland fire to protect, maintain, and enhance resources and, when possible, allow wildland fire to function in its natural ecological role.				Objective: Use wildland fire to protect, maintain, and enhance resources and, when possible, allow wildland fire to function in its natural ecological role. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The objective of the fire management program will be to allow fire to play its natural role in the ecosystem.
140.	Objective: Undertake emergency stabilization, rehabilitation, and restoration efforts to protect and sustain resources, public health and safety, and community infrastructure.	Objective: Rehabilitate and restore landscapes after wildland fire, as appropriate for site management goals.			Objective: Undertake emergency stabilization, rehabilitation, and restoration efforts to protect and sustain resources, public health and safety, and community infrastructure. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FIRE MANAGEMENT				Not for analysis. For comparison only.	
141.	<p>Objective: Maintain the general desired wildland fire condition by having ecosystems that are at a low risk of losing ecosystem components following wildfire and that function within their historical range. In terms of fire regime condition class, the desired wildland fire condition outside wildland-urban interface is to trend to a lower fire regime condition class using the least intrusive methods possible. In other words, the desired wildland fire condition is to move lands in fire regime condition class 3 to fire regime condition class 2 and lands in fire regime condition class 2 to fire regime condition class 1 through fire and nonfire treatments where wildland fire use is the preferred method of treatment, when feasible. Inside the wildland-urban interface, the general desired wildland fire condition is to have less potential for values to be threatened by wildland fire, usually through some modification of fuels.</p>	<p>Objective: Maintain ecosystems that are at low risk of losing ecosystem components (such as ecosystems functioning within their historical range) and restore ecosystems that are at a moderate to high risk of losing ecosystem components (such as ecosystems functioning outside their historical range).</p>			<p>Objective: Maintain the general Desired Wildland Fire Condition by having ecosystems that are at a low risk of losing ecosystem components following wildfire and that function within their historical range. In terms of Fire Regime Condition Class, the Desired Wildland Fire Condition outside Wildland-Urban Interface is to trend to a lower Fire Regime Condition Class using the least intrusive methods possible. In other words, the Desired Wildland Fire Condition is to move lands from Fire Regime Condition Class 3 to Fire Regime Condition Class 2 and lands in Fire Regime Condition Class 2 to Fire Regime Condition Class 1 through fire and non-fire treatments where wildland fire use is the preferred method of treatment, when feasible. Inside the Wildland-Urban Interface, the general Desired Wildland Fire Condition is to have less potential for values to be threatened by wildland fire, usually through some modification of fuels. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Objective: No similar objective.</p>
142.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Where possible, prioritize wildland fire to protect, maintain, and enhance resources and to function in its natural ecological role. The decision to let fires burn can occur if 1) the fire is naturally caused and 2) the Fire Management Plan identifies the area as one in which fire might be used as a tool and such use is concurred to by an agency administrator or fire escapes initial attack and 3) the Wildland Fire Decision Support System results in such a decision.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>
143.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Implement landscape-scale ecosystem restoration projects to restore functional vegetative communities.</p>	<p>Management Direction: Implement landscape-scale ecosystem restoration projects to restore native functional vegetative communities, with a prioritization of natural processes and techniques over other methods.</p>		<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FIRE MANAGEMENT				Not for analysis. For comparison only.	
144.	Management Direction: No similar management direction.	Management Direction: Use wildland fire across GSENM, except where fire suppression would: <ul style="list-style-type: none"> • Protect life and property • Prevent uncharacteristic wildland fire in native habitats • Protect special status species habitat from uncharacteristic wildland fire • Benefit the protection of GSENM objects. 			Management Direction: No similar management direction.	Management Direction: No similar management direction.
145.	Management Direction: No similar management direction.	Management Direction: Stabilize, rehabilitate, and restore landscape characteristics after wildland fires to restore native ecosystems, as appropriate for site management goals.	Management Direction: Stabilize, rehabilitate, and restore landscape characteristics after wildland fires to enhance and restore native ecosystems, prioritizing natural processes over other methods.		Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS WITH WILDERNESS CHARACTERISTICS				Not for analysis. For comparison only.	
146.	Goal: Protect, preserve, and maintain the appearance of naturalness and outstanding opportunities for solitude and/or primitive and unconfined recreation, as well as supplemental values (such as ecological, geological, or other features of scientific, educational, scenic, or historical value) within lands with wilderness characteristics, as appropriate.				Goal: Protect, preserve, and maintain the appearance of naturalness and outstanding opportunities for solitude and/or primitive and unconfined recreation within lands with wilderness characteristics, as appropriate. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
147.	Objective: No similar objective.	Objective: Determine appropriate management and land use allocations for lands with wilderness characteristics.			Objective: No similar objective.	Objective: No similar objective.
148.	Allocation: <ul style="list-style-type: none"> • Manage 0 acres to protect lands with wilderness characteristics while providing for compatible uses. • Manage 0 acres to minimize impacts on wilderness characteristics while emphasizing other uses. • Manage 559,600 acres to allow for other uses while not protecting lands with wilderness characteristics. 	Allocation: <ul style="list-style-type: none"> • Manage 72,000 acres to <u>protect</u> lands with wilderness characteristics while providing for compatible uses. <ul style="list-style-type: none"> ○ Lands with wilderness characteristics that are wholly surrounded by wilderness study areas. • Manage 0 acres to <u>minimize</u> impacts on wilderness characteristics while allowing compatible uses that are consistent with the protection of GSENM objects. • Manage 487,600 acres for other compatible uses while <u>not protecting</u> wilderness characteristics. <ul style="list-style-type: none"> ○ Lands with wilderness characteristics that are not wholly within wilderness study areas. 	Allocation: <ul style="list-style-type: none"> • Manage 190,100 acres to <u>protect</u> lands with wilderness characteristics while providing for compatible uses. <ul style="list-style-type: none"> ○ Lands with wilderness characteristics in the primitive area • Manage 366,900 acres to <u>minimize</u> impacts on wilderness characteristics while allowing compatible uses that are consistent with the protection of GSENM objects. <ul style="list-style-type: none"> ○ Lands with wilderness characteristics in the passage and outback areas • Manage 2,600 acres for other compatible uses while <u>not protecting</u> wilderness characteristics. <ul style="list-style-type: none"> ○ Lands with wilderness characteristics in the front country area 	Allocation: <ul style="list-style-type: none"> • Manage 559,600 acres to <u>protect</u> lands with wilderness characteristics while providing for compatible uses. • Manage 0 acres to <u>minimize</u> impacts on wilderness characteristics while allowing compatible uses that are consistent with the protection of GSENM objects. • Manage 0 acres for other compatible uses while <u>not protecting</u> wilderness characteristics. 	Allocation: <ul style="list-style-type: none"> • Manage 0 acres to protect lands with wilderness characteristics while providing for compatible uses. • Manage 0 acres to minimize impacts on wilderness characteristics while emphasizing other multiple uses. • Manage 559,600 acres to allow for other multiple uses while not protecting lands with wilderness characteristics. 	Allocation: No similar allocation.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS WITH WILDERNESS CHARACTERISTICS				Not for analysis. For comparison only.	
149.	<p>Management Direction: Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for uses, subject to management actions for other resources and resource uses within this plan. Where identified lands with wilderness characteristics are managed for other uses within GSENM, any activity would still ensure the proper care and management of GSENM objects.</p>	<p>Management Direction: Manage lands with wilderness characteristics managed to <u>protect</u> those characteristics while providing for compatible uses as follows:</p> <ul style="list-style-type: none"> • VRM Class I • Closed to OHV travel • ROW exclusion • Allow vegetation management and restorations that enhance or preserve wilderness characteristics • Restrict construction of new structures and facilities unrelated to the preservation or enhancement of wilderness characteristics or necessary for the management of existing uses 			<p>Management Direction: Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for multiple uses, subject to management actions for other resources and resource uses within this plan. Where identified lands with wilderness characteristics are managed for other multiple uses within GSENM, any activity would still ensure the proper care and management of the monument objects. (GSENM ROD 2020)</p> <p>Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for multiple uses, subject to management actions for other resources and resource uses within this plan. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS WITH WILDERNESS CHARACTERISTICS				Not for analysis. For comparison only.	
150.	<p>Management Direction: Manage the lands with wilderness characteristics for multiple uses to the extent that doing so is consistent with the protection of GSENM objects.</p>	<p>Management Direction: No similar management direction. (No lands with wilderness characteristics would be managed to <u>minimize</u> impacts on wilderness characteristics while allowing compatible uses that do not adversely impact GSENM objects.)</p>	<p>Management Direction: Manage lands with wilderness characteristics managed to <u>minimize</u> impacts on wilderness characteristics while allowing compatible uses that do not adversely impact GSENM objects and resources as follows:</p> <ul style="list-style-type: none"> • Allow developments only if it will not diminish the total acres required to maintain lands with wilderness characteristics. 	<p>Management Direction: No similar management direction (all lands with wilderness characteristics would be managed for their protection).</p>	<p>Management Direction: Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for multiple uses, subject to management actions for other resources and resource uses within this plan. Where identified lands with wilderness characteristics are managed for other multiple uses within GSENM, any activity would still ensure the proper care and management of the monument objects. (GSENM ROD 2020)</p> <p>Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for multiple uses, subject to management actions for other resources and resource uses within this plan. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS WITH WILDERNESS CHARACTERISTICS				Not for analysis. For comparison only.	
151.	<p>Management Direction: Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for multiple uses, subject to management actions for other resources and resource uses within this plan. Where identified lands with wilderness characteristics are managed for other multiple uses within GSENM, any activity would still ensure the proper care and management of GSENM objects.</p>	<p>Management Direction: Manage lands with wilderness characteristics that are managed for other compatible uses while <u>not protecting</u> wilderness characteristics according to other prescriptions in this alternative.</p>		<p>Management Direction: No similar management direction (all lands with wilderness characteristics would be managed for their protection).</p>	<p>Management Direction: Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for multiple uses, subject to management actions for other resources and resource uses within this plan. Where identified lands with wilderness characteristics are managed for other multiple uses within GSENM, any activity would still ensure the proper care and management of the monument objects. (GSENM ROD 2020)</p> <p>Do not apply any provisions specifically to protect wilderness characteristics. Manage lands with wilderness characteristics for multiple uses, subject to management actions for other resources and resource uses within this plan. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILD HORSES				Not for analysis. For comparison only.	
152.	Goal: Manage wild horses in accordance with the Wild Free-Roaming Horse and Burro Act of 1971, as amended.				Goal: Manage wild horses in accordance with the Wild Free-Roaming Horse and Burro Act of 1971. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
153.	Objective: The Harvey's Fear and Moody-Wagon Box Mesa Herd Areas will not be managed for the continued presence of wild horses.				Objective: The Harvey's Fear and Moody-Wagon Box Mesa Herd Areas will not be managed for the continued presence of wild horses. (KEPA ROD 2020)	Objective: No similar objective.
154.	Management Direction: Remove wild horses from the Harvey's Fear and Moody-Wagon Box Mesa Herd Areas.				Management Direction: Remove wild horses from the Harvey's Fear and Moody-Wagon Box Mesa Herd Areas. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
155.	Management Direction: Remove wild horses from public lands that are outside the herd areas.				Management Direction: Remove wild horses from public lands that are outside the herd areas. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
156.	Management Direction: Conduct population surveys of wild horses within herd areas every 3 to 4 years.	Management Direction: No similar management direction.			Management Direction: Conduct population surveys of wild horses within herd areas every 3 to 4 years. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FORESTRY AND WOODLAND PRODUCTS				Not for analysis. For comparison only.	
157.	Goal: Promote, sustain, and improve forest health.	Goal: Ensure the resilience, health, and sustainable management of the forest and woodland ecosystems within GSENM, while preserving their biological diversity and productivity.			Goal: Promote, sustain, and improve forest health. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
158.	Objective: Improve forest and woodland health to protect watershed values and support wildlife habitat requirements. Maintain healthy forest/woodlands and populations of other plants. Manage areas with ponderosa pine and aspen to maintain and improve the stand health.	Objective: Maintain and restore forest and woodland health to protect watershed values, support wildlife habitat requirements, and reduce potential for catastrophic wildfires.	Objective: Maintain, enhance, and/or restore forest and woodland health to protect watershed values, support wildlife habitat requirements, and reduce potential for catastrophic wildfires.		Objective: Improve forest and woodland health to protect watershed values and support wildlife habitat requirements. (GSENM ROD 2020, KEPA ROD 2020) Maintain healthy forest/woodlands and populations of other plants. (GSENM ROD 2020, KEPA ROD 2020) Manage areas with ponderosa pine and aspen to maintain and improve the stand health. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
159.	Management Direction: Allow commercial fuelwood harvesting, post cutting, and Christmas tree cutting except in WSAs, and areas posted or signed as closed in order to meet forestry goals and objectives otherwise designated or subject to a stipulation. Prohibit the removal of ponderosa pine for Christmas trees. Allow commercial timber harvesting for the purposes of promoting or sustaining forest health across the entirety of GSENM.	Management Direction: Prohibit the commercial harvest of forestry and woodland products.			Management Direction: Allow commercial fuelwood harvesting, post cutting, and Christmas tree cutting except in WSAs, and areas posted or signed as closed in order to meet forestry goals and objectives otherwise designated or subject to a stipulation. (GSENM ROD 2020, KEPA ROD 2020) Prohibit the removal of ponderosa pine for Christmas trees. (GSENM ROD 2020, KEPA ROD 2020) Allow commercial timber harvesting for the purposes of promoting or sustaining forest health across the entirety of the monument units. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No commercial timber harvesting is authorized within the Monument.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FORESTRY AND WOODLAND PRODUCTS				Not for analysis. For comparison only.	
160.	<p>Management Direction: Allow noncommercial fuelwood harvesting, post cutting, and Christmas tree cutting except in WSAs, and areas posted or signed as closed in order to meet forestry goals and objectives otherwise designated or subject to a stipulation.</p> <p>Prohibit the removal of ponderosa pine for Christmas trees.</p> <p>Allow noncommercial timber harvesting for the purposes of promoting or sustaining forest health across the entirety of GSENM.</p>	<p>Management Direction: Allow for the noncommercial harvest of forestry and woodland products through the authorization of a permit, if it maintains watershed values, supports wildlife habitat requirements, and reduces potential for catastrophic wildfires.</p> <p>Prohibit noncommercial harvest of forestry and woodland products in the following areas:</p> <ul style="list-style-type: none"> • WSA • Lands with wilderness characteristics managed for protection • Ponderosa pine, Douglas-fir, mixed conifer, and aspen stands • Areas undergoing restoration • 330 feet from riparian areas 	<p>Management Direction: Allow for the noncommercial harvest of forestry and woodland products through the authorization of a permit in the designated wood harvesting areas. Additional areas may be designated, if it maintains watershed values, supports wildlife habitat requirements, and reduces potential for catastrophic wildfires.</p> <p>Prohibit noncommercial harvest of forestry and woodland products in the following areas:</p> <ul style="list-style-type: none"> • WSA • Lands with wilderness characteristics managed for protection • Ponderosa pine, Douglas-fir, mixed conifer, and aspen stands • Areas undergoing restoration • 330 feet from riparian areas 	<p>Management Direction: Prohibit noncommercial harvest of forestry and woodland products unless it furthers the protection of GSENM objects.</p>	<p>Management Direction: Allow noncommercial fuelwood harvesting, post cutting, and Christmas tree cutting except in WSAs, and areas posted or signed as closed in order to meet forestry goals and objectives otherwise designated or subject to a stipulation. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Prohibit the removal of ponderosa pine for Christmas trees. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Allow noncommercial timber harvesting for the purposes of promoting or sustaining forest health across the entirety of the monument units. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: There are currently two forestry product areas located in the Monument: Rock Springs Bench area and Buckskin Mountain area.</p> <p>Additional areas may be designated to meet the overall vegetation management objectives but will not be allowed outside already disturbed areas. All cutting areas will be designated under a permit system, with maps provided to assure compliance. (MMP 2000)</p> <p>Allow by permitting fuelwood harvesting, post cutting, and Christmas tree cutting only within designated areas (MMP 2000).</p> <p>As stated in the Proposed Plan, access off of designated routes will generally be allowed within 50 feet of the designated route, in designated fuelwood cutting areas. However, because fuelwood cutting is controlled by a permit and permits are issued to further overall management objectives, the BLM could authorize access on administrative routes and, in some cases, in areas more than 50 feet away from designated routes. These areas/provisions would be delineated in the permit prior to its issuance (MMP 2000).</p>
161.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Prohibit the felling or destruction of old-growth and mature trees (live and dead). Protect the ecological context of such trees through buffers around associated intact, natural ecological features.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>
162.	<p>Management Direction: Permit harvesting of woodland products in riparian areas for the maintenance and/or improvement of riparian ecosystems.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: Permit harvesting of woodland products in riparian areas for the maintenance and/or improvement of riparian ecosystems. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	FORESTRY AND WOODLAND PRODUCTS				Not for analysis. For comparison only.	
163.	Management Direction: Allow the sale of forest treatment residues as secondary wood products or biomass.	Management Direction: Make vegetation management residues (such as wood and other timber products left over after projects) for collection and removal only when this optimizes restoration of ecosystem health. Prioritize the use residues on-site or for other GSENM restoration activities whenever there is opportunity.			Management Direction: Allow the sale of forest treatment residues as secondary wood products or biomass. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
	<i>VEGETATION—PLANT AND SEED COLLECTION</i>					
164.	Management Direction: Allow commercial seed collection, except in WSAs. Areas and species available for commercial collection would be determined as climatic conditions allow, in accordance with BLM guidance and policy.	Management Direction: Allow commercial and noncommercial seed collection by permit to support restoration efforts. Areas and species available for collection will be determined as climatic conditions allow as well as ensuring maintenance and health of the seed source.			Management Direction: Allow commercial seed collection, except in WSAs. Areas and species available for commercial collection would be determined as climatic conditions allow, in accordance with BLM guidance and policy. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Preclude commercial seed collection.
165.	Management Direction: Allow commercial and noncommercial use of vegetation materials (excluding seed collection, fuelwood collection, and pine nut harvest) and collection in specified areas identified by permit as climatic conditions allow and in accordance with applicable policies, guidance, and regulations. Commercial collection and forest product removal in WSAs would not be allowed.	Management Direction: No similar management direction.			Management Direction: Allow commercial and noncommercial use of vegetation materials (excluding seed collection, fuelwood collection, and pine nut harvest) and collection in specified areas identified by permit as climatic conditions allow and in accordance with applicable policies, guidance, and regulations. Commercial collection and forest product removal in WSAs would not be allowed. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Preclude commercial use of vegetative materials.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
166.	Goal: Maintain, restore, or enhance rangeland health and provide for appropriate livestock grazing opportunities.	Goal: Protect and restore healthy native rangelands.			Goal: Maintain, restore, or enhance rangeland health and provide for appropriate livestock grazing opportunities. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
167.	Objective: Maintain, restore, or enhance sustainable rangeland ecosystems to meet the BLM Utah Rangeland Health Standards and to produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, clean water, sustainable economic benefits to local communities, and functional watersheds.	Objective: Implement livestock grazing management practices to meet the BLM Utah Rangeland Health Standards in a manner that is consistent with the protection of GSENM objects.			Objective: Maintain, restore, or enhance sustainable rangeland ecosystems to meet BLM Utah's Standards for Rangeland Health and to produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, clean water, sustainable economic benefits to local communities, and functional watersheds. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The [Grazing Management] process will be followed so that grazing management conforms with the grazing regulations and Utah's Standards and Guidelines. In this process, each grazing allotment will be assessed, and new allotment management plans will be developed, consistent with the BLM-wide grazing permit renewal process.
168.	Objective: Integrate livestock use and associated management practices with other needs and objectives to maintain, protect, and improve rangeland health while reducing conflicts.	Objective: Minimize conflicts between livestock grazing and other discretionary uses.			Objective: Integrate livestock use and associated management practices with other multiple use needs and objectives to maintain, protect, and improve rangeland health while reducing conflicts. (GSENM ROD 2020, KEPA ROD 2020)	Objective: In developing allocation plans for areas, efforts will be made to coordinate with other resource planning efforts (such as research, grazing allotment management plans), as discussed in the implementation and adaptive management framework [evaluation, planning, implementation, monitoring]. This type of integrated activity planning will lead to more comprehensive planning efforts for specific areas and to better decision-making.
169.	Objective: Reduce or eliminate livestock-related rangeland resource problems on all allotments not meeting rangeland health standards while maintaining livestock forage in the long term.	Objective: No similar objective.			Objective: Reduce or eliminate livestock-related rangeland resource problems on all allotments not meeting rangeland health standards while maintaining livestock forage in the long term. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
170.	Objective: Design grazing systems and range improvements to achieve and maintain healthy rangelands.	Objective: No similar objective.			Objective: Design grazing systems and range improvements to achieve and maintain healthy rangelands. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
	<i>LIVESTOCK GRAZING – ALLOCATIONS</i>					
171.	Management Direction: The existing holder voluntarily relinquished the grazing permit for the Big Bowns Bench Allotment and as such the lands are retired from livestock grazing consistent with Proclamation 10286 of October 8, 2021, 86 Fed. Reg. 57335 (October 15, 2021).	Management Direction: The existing holder voluntarily relinquished the grazing permit for the Big Bowns Bench Allotment, and as such the lands are retired from livestock grazing. The forage in the former allotment is not allocated for livestock consistent with Proclamation 10286 of October 8, 2021, 86 Fed. Reg. 57335 (October 15, 2021).			Management Direction: No similar management direction.	Management Direction: No similar management direction.
172.	Allocation: Allocate the following allotments or areas as unavailable for livestock grazing and maintain closures or cancel grazing permits, including the following areas: <ul style="list-style-type: none"> • Deer Creek Allotment, River pasture • Escalante River Allotment • Harvey’s Fear Allotment • Muley Twist • Navajo Bench • No Mans Mesa • Phipps Allotment, Upper River pasture • Phipps Allotment, Lower River pasture • Rattlesnake Bench Allotment • Rock Creek-Mudholes Allotment, Dry Rock Creek pasture • Spencer Bench • Willow Gulch Allotment, Lower Calf Creek Falls pasture <p>In areas that would be unavailable for livestock grazing,</p>	Allocation: Allocate the following allotments or areas as unavailable for livestock grazing and maintain closures or cancel grazing permit: <ul style="list-style-type: none"> • All allotments and pastures closed in Alternative A • Antone Flat • Big Bowns Bench • Deer Creek Allotment, Cottonwood pasture • Deer Creek Allotment, Wolverine Bench pasture • Dry Hollow • Flag Point • Little Bown’s Bench • Longneck • McGath Point • Phipps Allotment, Phipps pasture • Rock Creek-Mudholes Allotment, Middle Rock Creek pasture • Saltwater Creek • Steep Creek • Upper Paria, South pasture • Additional unallotted areas in Glen Canyon 	Allocation: Allocate the following allotments or areas as unavailable for livestock grazing, cancel any existing term grazing permits, and prohibit new term grazing permits: <ul style="list-style-type: none"> • All allotments and pastures included in Alternative B. • Glen Canyon allotments/areas <ul style="list-style-type: none"> ○ Lake, Navajo Point pasture ○ Lower Warm Creek ○ Soda ○ Rock Creek-Mudholes, Grand Bench pasture ○ Lake Powell ○ Fortymile Ridge 	Allocation: Allocate the following allotments or areas as unavailable for livestock grazing, cancel any existing term grazing permits, and prohibit new term grazing permits: <ul style="list-style-type: none"> • All allotments and pastures included in Alternative C with the following additions: • Black Rock (State) • Boot • Boulder Creek • Cockscomb • Circle Cliffs • Cottonwood • Coyote • Death Hollow • First Point • Ford Well • Granary Ranch • Headwaters • Hells Bellows • Johnson Point • King Bench • Locke Ridge • Lower Hackberry • Meadow Canyon • Mud Springs 	Allocation: Allocate 108,726 acres unavailable for livestock grazing and maintain closures or cancel grazing permits, including the following areas: <ul style="list-style-type: none"> • Deer Creek Allotment, River pasture • Escalante River Allotment • Harvey’s Fear Allotment • Muley Twist • Navajo Bench • No Mans Mesa • Phipps Allotment, Upper River pasture • Phipps Allotment, Lower River pasture • Rattlesnake Bench Allotment • Rock Creek-Mudholes Allotment, Dry Rock Creek pasture • Spencer Bench • Willow Gulch Allotment, Lower Calf Creek Falls pasture <p>In areas that would be unavailable for livestock grazing, livestock could be used to achieve resource objectives such as fuel reductions and/or weed control. (GSENM ROD 2020, KEPA ROD 2020)</p>	In the 2000 MMP, livestock grazing allocations for allotments available and unavailable for livestock grazing, as well as area-wide AUMs, were deferred to a future grazing plan that would evaluate and renew permits for each allotment administered by GSENM. Such a plan did not take place. The allocations for available and unavailable in this section reflect the scenario that existed prior to approval of the 2000 RMPs. Allocation: Allocate 108,726 acres unavailable for livestock grazing and maintain closures in the following areas: <ul style="list-style-type: none"> • Big Bowns Bench, River pasture • Deer Creek Allotment, Cottonwood and River pastures • Dry Hollow • Escalante River • Harvey’s Fear Allotment • Longneck • McGath Point • Muley Twist • Navajo Bench

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
172. (cont.)	livestock could be used to achieve resource objectives such as fuel reductions and/or weed control.	(See above.)	(See above.)	<ul style="list-style-type: none"> • Nipple Bench • Round Valley • Roy Willis • Rush Beds • School Section • Second Point (State) • Sink Holes • Slick Rock (State) • Timber Mountain • Upper Hackberry • Upper Paria • Vermilion • Wagon Box Mesa • Wahweap • White Rock • White Sage • Willow Gulch 	(See above.)	<ul style="list-style-type: none"> • Phipps Allotment, Upper River pasture • Rattlesnake Bench Allotment • Rock Creek-Mudholes Allotment, Dry Rock Creek and Middle Rock Creek pastures • Saltwater Creek • Spencer Bench • Steep Creek • Willow Gulch Allotment, Lower Calf Creek Falls pasture <p>Manage reserve common allotments (forage reserves) in the following areas. These forage reserves would only be used during emergencies or for research purposes. Emergencies would include, but would not be limited to, drought, insect outbreaks, fire, or floods. Any emergency use would not exceed current authorized use and could occur from October 1 to March 31:</p> <ul style="list-style-type: none"> • Deer Creek Allotment, Wolverine Bench pasture (3,816 acres) • Little Bown's Bench (3,422 acres) • Phipps Allotment, Phipps Pasture (7,365 acres)
173.	Allocation: Allocate 2,134,800 acres as available for livestock grazing.	Allocation: Allocate 2,037,300 acres as available for livestock grazing.	Allocation: Allocate 1,927,000 acres as available for livestock grazing.	Allocation: Allocate 1,150,000 acres as available for livestock grazing.	Allocation: Allocate 2,136,602 acres as available for livestock grazing. (GSENM ROD 2020; KEPA ROD 2020)	Allocation: Allocate 2,053,761 acres as available for livestock grazing.
174.	Management Direction: Manage the previously unallotted Antone Flat, Upper Paria—South pasture, and Varney Griffin allotments as available for livestock grazing. Conduct assessments to determine available AUMs.	Management Direction: No similar management direction.			Management Direction: Manage the previously unallotted Antone Flat, Upper Paria—South pasture, and Varney Griffin allotments as available for livestock grazing. Conduct assessments to determine available AUMs. (GSENM ROD 2020; KEPA ROD 2020)	Management Direction: Continue the unallotted status of the following areas by not allocating livestock forage in these areas: <ul style="list-style-type: none"> • Antone Flat (continue to allow trailing) (note: Antone Flat is entirely in the Kanab Field Office [KFO]) • Upper Paria (South pasture) • Flag Point • Unallotted areas in Glen Canyon • Varney Griffin • No Mans Mesa

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING					
175.	<p>Allocation: Allocate 107,995 AUMs.</p> <p>When active AUMs reach 95 percent of permitted AUMs, reevaluate whether the maximum permitted AUMs may be increased. Increasing permitted AUMs would require a plan amendment and associated NEPA analysis.</p>	<p>Allocation: Allocate 105,034 AUMs (active and suspended) for livestock. Upon voluntary relinquishment of a grazing permit or lease, the number of allocated AUMs will automatically decrease by the number of AUMs authorized by that permit or lease at the time of relinquishment, unless the BLM determines that the reallocation of grazing forage associated with the relinquished permit or lease will advance the purposes of Proclamations 10286 and 6920.</p>	<p>Allocation: Allocate 95,406 AUMs (active and suspended) for livestock. Upon voluntary relinquishment of a grazing permit or lease, the number of allocated AUMs will automatically decrease by the number of AUMs authorized by that permit or lease at the time of relinquishment, unless the BLM determines that the reallocation of grazing forage associated with the relinquished permit or lease will advance the purposes of Proclamations 10286 and 6920.</p>	<p>Allocation: Allocate 45,248 AUMs (active) for livestock. Upon voluntary relinquishment of a grazing permit or lease, the number of allocated AUMs will automatically decrease by the number of AUMs authorized by that permit or lease at the time of relinquishment, unless the BLM determines that the reallocation of grazing forage associated with the relinquished permit or lease will advance the purposes of Proclamations 10286 and 6920.</p>	<p>Allocation: Allocate 107,995 AUMs.</p> <p>When active AUMs reach 95% of permitted AUMs reevaluate whether the maximum permitted AUMs may be increased. Increasing permitted AUMs would require a plan amendment and associated NEPA analysis. (GSENM ROD 2020; KEPA ROD 2020)</p>	<p>Allocation: Allocate 106,202 AUMs.</p>
	<i>LIVESTOCK GRAZING – GRAZING MANAGEMENT PRACTICES</i>					
176.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Within 2 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations, on allotments within the following watersheds:</p> <ul style="list-style-type: none"> • Horse Canyon-Escalante River • Upper Paria • Hackberry Canyon-Cottonwood Creek • Upper Wahweap Creek • Upper Johnson Wash • White Sage Wash • Boulder Creek-Escalante River • Middle Paria <p>The land health assessments and causal factor determinations will inform the BLM's full processing of livestock grazing permit renewals for allotments within those watersheds, which will be completed within 5 years of the signing of the ROD.</p> <p>Once the assessments/determinations and fully processed permit renewals have been completed in these priority watersheds, implement a plan to conduct land health assessments and, if needed causal factor, determinations, and fully-process all remaining permit renewals across GSENM, which will be completed within 10 years of the signing of the ROD.</p> <p>If a land health determination indicates that grazing use is not consistent with the provisions of 43 CFR 4180, decrease permitted use in accordance with 43 CFR 4110.3-2 and make changes to grazing practices to support the achievement of the BLM Utah Rangeland Health Standards and ensure consistency with the protection and restoration of GSENM objects.</p>		<p>Management Direction: Within 10 years of the signing of the ROD, complete land health assessments and, if needed, causal factor determinations, and fully process all permit renewals across GSENM. If a land health determination indicates that grazing use is not consistent with the provisions of 43 CFR 4180, decrease permitted use in accordance with 43 CFR 4110.3-2 and make changes to grazing practices to support the achievement of the BLM Utah Rangeland Health Standards and ensure consistency with the protection and restoration of GSENM objects.</p>	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
177.	Management Direction: The allotments or pastures are available as individual allotments, or they could be combined with other allotments based on the needs of the permittee and management for that allotment.	Management Direction: No similar management direction.			Management Direction: The allotments or pastures are available as individual allotments or could be combined with other allotments based on the needs of the permittee and management for that allotment. (GSENM ROD 2020)	Management Direction: No similar management direction.
178.	Management Direction: In the following pastures and allotments, allow water gaps of up to 1/8 mile to provide river access to cattle while protecting the resources and other uses in the area: <ul style="list-style-type: none"> • Big Bowns Bench, River Pasture • Deer Creek Allotment, River Pasture 	Management Direction: No similar management direction (Big Bowns Bench Allotment is unavailable and retired; River Pasture of Deer Creek Allotment is unavailable).			Management Direction: In the following pastures and allotments, allow water gaps of up to 1/8 mile to provide river access to cattle while protecting the resources and other uses in the area: <ul style="list-style-type: none"> • Big Bowns Bench, River Pasture • Deer Creek Allotment, River Pasture (GSENM ROD 2020)	Actions Allowable Uses: No similar management direction.
179.	Management Direction: “Should grazing permits or leases be voluntarily relinquished by existing holders, the Secretary shall retire from livestock grazing the lands covered by such permits or leases pursuant to the processes of applicable law. Forage shall not be reallocated for livestock grazing purposes unless the Secretary specifically finds that such reallocation will advance the purposes of this proclamation and Proclamation 6920.” (Proclamation 10286 of October 8, 2021, 86 Fed. Reg. 57335. October 15, 2021) If a holder voluntarily relinquishes its grazing permit or lease, the lands covered by such permit or lease will automatically become unavailable for livestock grazing in accordance with Proclamation 10286.	Management Direction: Proclamation 10286 provides: “Should grazing permits or leases be voluntarily relinquished by existing holders, the Secretary shall retire from livestock grazing the lands covered by such permits or leases pursuant to the processes of applicable law. Forage shall not be reallocated for livestock grazing purposes unless the Secretary specifically finds that such reallocation will advance the purposes of this proclamation and Proclamation 6920.” If a holder voluntarily relinquishes its grazing permit or lease, or portion thereof, the lands covered by such permit or lease, or portion of the lands, will automatically become unavailable for livestock grazing in accordance with Proclamation 10286. Upon receiving a written voluntary relinquishment of an existing grazing permit or lease, the BLM will: <ul style="list-style-type: none"> • Review the permittee or lessee grazing case record and verify that the permit or lease being voluntarily relinquished is valid and authorizes livestock grazing on public lands in GSENM. • Provide a written acknowledgement of the voluntary relinquishment to the permit or lease holder. • Update the Rangeland Administration System, modify the allotment record, and update other applicable records upon relinquishment. • Update the acreage figures in the GSENM RMP to reflect that the lands covered by the voluntarily relinquished permit or lease are unavailable for livestock grazing via plan maintenance. • Manage the lands previously subject to the voluntarily relinquished permit or lease for the conservation of wildlife forage and habitat. The BLM Authorized Officer will impose restrictions on applications for uses that are inconsistent with the use of the subject lands being managed for the conservation of wildlife forage and habitat. • Reallocate the forage associated with a voluntarily relinquished permit or lease to wildlife, unless such forage is reallocated for livestock grazing purposes to specifically enhance the protection of GSENM objects identified in Proclamation 10286. • Remove unnecessary range improvement projects on the lands covered by the voluntarily relinquished permit or lease and rehabilitate any water developments to a more natural state. Such removal actions may require NEPA review and decision-making. 			Management Direction: Comply with BLM policy for voluntary relinquishment. The authorized officer may take one or more of the following actions: <ul style="list-style-type: none"> • Issue a grazing permit to a different applicant. • Stock with livestock from another allotment with unmet resource objectives. • Combine with an adjacent allotment that has unmet resource objectives. • Consider use of the allotment as a reserve common allotment (that is, continue livestock grazing but do not recognize an individual with preference to the forage). • Amend or revise the land use plan to allocate forage to uses other than livestock grazing. In other words, the land use plan would be amended or revised to allocate the allotment as unavailable for livestock grazing. • Preference would be for one of the following: 	Management Direction: Should an allotment or a portion of an allotment become available through a voluntary relinquishment or an operation of law, it will be considered for grass banking. The BLM is not obligated to graze the grass bank allotment annually, and use of the grass bank by qualified applicants, permittees, or lessees is within the discretion of the BLM.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
LIVESTOCK GRAZING						
179. (cont.)	<p>Upon receiving a written voluntary relinquishment of an existing grazing permit or lease, the BLM will:</p> <ul style="list-style-type: none"> Review the permittee or lessee grazing case record and verify that the permit or lease being voluntarily relinquished is valid and authorizes livestock grazing on public lands in GSENM. Provide a written acknowledgement of the voluntary relinquishment to the permit or lease holder. Update the Rangeland Administration System, modify the allotment record, and update other applicable records upon relinquishment. Update the acreage figures in the GSENM RMP to reflect that the lands covered by the voluntarily relinquished are unavailable for livestock grazing, via plan maintenance. Manage the lands previously subject to the voluntarily relinquished permit or lease for the conservation of wildlife forage and habitat. The BLM Authorized Officer will impose restrictions on applications for uses that are inconsistent with the use of the subject lands being managed for the conservation of wildlife forage and habitat. Reallocate the forage associated with a voluntarily relinquished permit or lease to wildlife, unless such forage is reallocated for livestock grazing purposes to enhance the protection of GSENM 	<p>In the case of common allotments, the voluntary relinquishment of a grazing permit or lease by one permit or lease holder will result in a reduction of:</p> <ul style="list-style-type: none"> The overall authorized number of AUMs on the allotment as a whole. While the entire allotment would continue to be grazed by the remaining permit or lease holder(s), the voluntarily relinquished permit or lease would result in a reduction in the number of AUMs available for the allotment. The reduction would correspond to the number of permitted AUMs (including active and suspended AUMs) authorized under the voluntarily relinquished permit or lease. Increasing active AUMs on remaining permits or leases by converting suspended AUMs to active AUMs to replace the retired AUMs would not be allowed; or, The overall authorized number of AUMs and the geographic area available for grazing on the allotment, when all the existing holders of a permit or lease pertaining to that allotment agree, in writing, that a specific geographic portion of the allotment is appropriate to retire due to the full or partial voluntary relinquishment of a holder's permit or lease. In such case, the BLM would honor the remaining permit or lease holder(s) agreement to no longer graze that geographic area and the overall authorized number of AUMs would be reduced, as described in the previous bullet. <p>A grazing permittee's or lessee's voluntary relinquishment of its livestock grazing permit or lease does not involve a BLM decision and therefore, it does not require compliance with NEPA, and it cannot be protested or appealed under 43 CFR subpart 4160. A voluntary relinquishment and the resulting retirement of the subject lands from livestock grazing does not require the BLM change the classification of any area within such lands that have been established as a grazing district under the Taylor Grazing Act. The United States is not obligated to compensate permittees/lessees for any interest in authorized range improvements used in conjunction with the relinquished permit or lease.</p>			<p style="text-align: center;">Not for analysis. For comparison only.</p> <ul style="list-style-type: none"> Issue a grazing permit to a different applicant. Stock with livestock from another allotment with unmet resource objectives. Combine with an adjacent allotment that has unmet resource objectives. <p>(GSENM ROD 2020, KEPA ROD 2020)</p>	<p>(See above.)</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
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179. (cont.)	<p>objects identified in Proclamation 10286.</p> <ul style="list-style-type: none"> Remove unnecessary range improvement projects on the lands covered by the voluntary relinquishment and rehabilitate any water developments to a more natural state. Such actions may require NEPA review and decision-making. <p>In the case of common allotments, the voluntary relinquishment of a grazing permit or lease by one permit or lease holder will result in a reduction of the overall authorized number of AUMs on the allotment as a whole. While the entire allotment would continue to be grazed by the remaining permit or lease holder(s), the voluntarily relinquished permit or lease would result in a reduction in the number of AUMS available for the allotment. The reduction would correspond to the number of permitted AUMs (including active and suspended AUMs) authorized under the voluntarily relinquished permit or lease.</p> <p>A grazing permittee's or lessee's voluntary relinquishment of its livestock grazing permit or lease does not involve a BLM decision and therefore does not require compliance with NEPA and cannot be protested or appealed under 43 CFR subpart 4160. A voluntary relinquishment and the resulting retirement of the subject lands from livestock grazing does not require the BLM change the classification of</p>	(See above.)			(See above.)	(See above.)
					Not for analysis. For comparison only.	

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
179. (cont.)	any area within such lands that have been established as a grazing district under the Taylor Grazing Act. The United States is not obligated to compensate permittees/lessees for any interest in authorized range improvements used in conjunction with the relinquished permit or lease.	(See above.)			(See above.)	(See above.)
180.	<p>Management Direction: Adaptively manage season of use, duration, and distribution of livestock grazing to meet or move toward meeting the BLM Utah Rangeland Health Standards before considering changes to stocking rate (AUMs). Actions to improve land health include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Maintain existing developments (structural and nonstructural improvements). • Install new developments (such as water developments and fences). • Implement nonstructural range improvements (such as restore shrub lands, control juniper, and control or eradicate invasive species). • Improve livestock distribution through range improvements, salting, supplements, or other techniques. During the permit renewal NEPA process, analyze adjustment of the season of use, duration, and recovery periods based on monitoring data. Where appropriate, provide flexibility in grazing dates, managing for conditions rather than calendar year. 	<p>Management Direction: Identify opportunities during the full processing of livestock grazing permit renewals to allow for adaptive management approaches that best support the achievement of the BLM Utah Rangeland Health Standards and resource management, and ensure consistency with the protection and restoration of GSENM objects. Adaptive management approaches, as incorporated into a permit's terms and conditions, may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Adjusting livestock distribution, season of use, grazing duration, and recovery periods. • Managing for measured resource conditions, rather than calendar dates. 			<p>Management Direction: Adaptively manage season of use, duration, and distribution of livestock grazing to meet or move toward meeting BLM Utah Rangeland Health Standards, before considering changes to stocking rate (AUMs). Actions to improve land health include, but are not limited to:</p> <ul style="list-style-type: none"> • Maintain existing developments (structural and nonstructural improvements). • Install new developments (such as water developments and fences). • Implement nonstructural range improvements (such as restore shrub lands, control juniper, and control or eradicate invasive species). • Improve livestock distribution through range improvements, salting, supplements, or other techniques. During the permit renewal NEPA process, analyze adjustment of the season of use, duration, and recovery periods based on monitoring data. Where appropriate, provide flexibility in grazing dates, managing for conditions rather than calendar year. (GSENM ROD 2020, KEPA ROD 2020) 	<p>Management Direction: Water developments can be used as a management tool throughout the Monument for the following purposes: better distribution of livestock when deemed to have an overall beneficial effect on Monument resources, including water sources or riparian areas, or to restore or manage native species or populations. They can be done only when a NEPA analysis determines this tool to be the best means of achieving the above objectives and only when the water development would not dewater streams or springs.</p> <p>Developments will not be permitted to increase overall livestock numbers. Maintenance of existing developments can continue but may require NEPA analysis and must be consistent with the objectives of this Plan.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
181.	<p>Management Direction: Any proposal to change the species of livestock to domestic sheep/goats would be considered per BLM Manual 1730 (or most recent guidance). A site-specific analysis of any proposal would be conducted to identify the level of risk to the health of wild sheep and determine whether the action can occur and still achieve effective separation between domestic sheep/goats and wild sheep.</p>	<p>Management Direction: Ensure that all applicable management provides for effective physical separation between domestic sheep/goats and wild sheep.</p>	<p>Management Direction: Prohibit sheep or goats as a species of livestock on 10-year grazing permits.</p> <p>Sheep and goats could be used, as appropriate, for vegetation management or scientific research purposes, if effective physical separation between domestic sheep/goats and wild sheep is maintained.</p>		<p>Management Direction: Any proposal to change the species of livestock to domestic sheep/goats would be considered per BLM Manual 1730 (or most recent guidance). A site-specific analysis of any proposal would be conducted to identify the level of risk to the health of wild sheep and determine whether the action can occur and still achieve effective separation between domestic sheep/goats and wild sheep. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
182.	<p>Management Direction: If ungrazed reference areas are established, do not exceed 0.5 percent or 80 acres, whichever is less, in any allotment or 0.5 percent within GSENM. Allotments or pastures identified as unavailable for livestock grazing may not count toward the 0.5 percent cap within GSENM.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: If ungrazed reference areas are established, do not exceed 0.5 percent or 80 acres, whichever is less, in any allotment or 0.5 percent within GSENM. Allotments or pastures identified as unavailable for livestock grazing may not count toward the 0.5 percent cap within the monument. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
183.	<p>Management Direction: Continue to use existing monitoring techniques and implement others as new methods arise. Monitoring will focus on land health.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: Continue to use existing monitoring techniques and implement others as new methods arise. Monitoring will focus on land health. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
184.	<p>Management Direction: Follow current policy (currently BLM Instruction Memorandum 2013-094, Resource Management During Drought).</p>	<p>Management Direction: Implement seasonal reductions in AUMs in allotments during drought years. Use the U.S. Drought Monitor as a guide to indicate drought, coupled with the determination by the BLM Authorized Officer in communication with GSENM specialists regarding allotment-specific conditions.</p>			<p>Management Direction: Follow current policy (currently BLM Instruction Memorandum 2013-094, Resource Management During Drought). (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
	<i>Structural and Nonstructural Range Improvements</i>					
185.	Management Direction: No similar management direction.	Management Direction: Allow maintenance of existing structural range improvements as follows: <ul style="list-style-type: none"> • Essential maintenance in accordance with the terms and conditions of grazing permits in order to provide for ongoing management of livestock grazing, including repairs (such as of fences, springs boxes, and line breaks) and in-kind replacements (such as of valves, minor solar panels stands, and incidental broken elements of infrastructure). • Other maintenance, including that which requires environmental compliance processes, if both the structural range improvement and maintenance are consistent with the protection of GSENM objects. 			Management Direction: No similar management direction.	Management Direction: No similar management direction.
186.	Management Direction: No similar management direction.	Management Direction: Allow modification of existing structural range improvements if both the structural range improvement and modifications are consistent with the protection of GSENM objects.	Management Direction: Same as Alternative B, but only if a current (within the last 10 years) land health assessment has been completed, and, if needed, a causal factor determination has been made for the allotment or applicable watershed. As informed by the land health assessment and causal factor determination, ensure that the modifications to the structural range improvements support the achievement of the BLM Utah Rangeland Health Standards and that they are consistent with the protection of GSENM objects. An exception to this restriction could be approved for modifications to structural range improvements that would exclude livestock from an area and/or prevent imminent damage to GSENM objects and resources.		Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
187.	Management Direction: No similar management direction.	Management Direction: Allow new structural range improvements if both the structural range improvement and the construction are consistent with the protection of GSENM objects.	Management Direction: Same as Alternative B, but only if a current (within the last 10 years) land health assessment has been completed and, if needed, a causal factor determination has been made for the allotment or applicable watershed. An exception to this restriction could be approved for new structural range improvements that would exclude livestock from an area and/or prevent imminent damage to GSENM objects. <u>Front Country and Passage Areas:</u> As informed by the land health assessment and causal factor determination, ensure that new structural range improvements support the achievement of the BLM Utah Rangeland Health Standards and that they are consistent with the protection and restoration of GSENM objects. <u>Outback and Primitive Areas:</u> Same as Alternative D.	Management Direction: Allow new structural range improvements on allotments if construction is consistent with the protection of GSENM objects and only if a current (within the last 10 years) land health assessment has been completed and, if needed, a causal factor determination has been made for the allotment or applicable watershed. An exception “o this restriction” could be approved for new structural range improvements that would exclude livestock from an area and/or prevent imminent damage to GSENM objects. As informed by the land health assessment and causal factor determination, ensure that new structural range improvements support the achievement of the BLM Utah Rangeland Health Standards and that they would enhance the protection and restoration of GSENM objects.	Management Direction: No similar management direction.	Management Direction: No similar management direction.
188.	Management Direction: In areas available for livestock grazing, restore existing nonstructural range improvements (seedings) using a mix of native and nonnative species.	Management Direction: No similar management direction (see <i>Vegetation</i>).			Management Direction: In areas available for livestock grazing, restore existing nonstructural range improvements (seedings) using a mix of native and nonnative species. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LIVESTOCK GRAZING				Not for analysis. For comparison only.	
189.	<p>Management Direction: Complete land treatments to promote healthy landscapes and improve livestock management to meet rangeland health standards. Allocate the AUMs proportionally among all operators within the affected allotments. Do not implement range improvements for the primary purpose of increasing forage for livestock.</p> <p>Allow creation of new nonstructural range improvements where not otherwise restricted by another designation.</p>	<p>Management Direction: Prohibit nonstructural range improvements with a primary purpose of increasing forage for livestock.</p>			<p>Management Direction: Complete land treatments to promote healthy landscapes and improve livestock management to meet rangeland health standards. Allocate the AUMs proportionally among all operators within the affected allotments. Do not implement range improvements for the primary purpose of increasing forage for livestock. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Allow creation of new nonstructural range improvements where not otherwise restricted by another designation. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
190.	<p>Management Direction: The need for and extent of range improvements is considered on a case-by-case basis and in conformance with the RMPs and with the objectives and actions in this alternative. Best practices include cutting of juniper posts or stays by permittees for the improvement or maintenance of structural range improvements.</p>	<p>Management Direction: No similar management direction. (See management direction regarding range improvement.)</p>			<p>Management Direction: The need for and extent of range improvements is considered on a case-by- case basis and in conformance with the RMPs and with the objectives and actions in this alternative. Best practices include cutting of juniper posts or stays by permittees for the improvement or maintenance of structural range improvements. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
191.	<p>Management Direction: Prioritize changing grazing management practices (such as changing season of use and fencing) before reducing AUMs on allotments to resolve conflicts with other uses.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: Prioritize changing grazing management practices (such as changing season of use and fencing) before reducing AUMs on allotments to resolve conflicts with other uses. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
192.	<p>Goal: Provide recreational opportunities in a variety of physical, social, and administrative settings, from primitive to rural, including front-country, which allows visitors to have desired recreational experiences and enjoy the resulting benefits.</p> <p>Provide opportunities for visitor use and enjoyment of the area, consistent with resource capabilities, and mandated resource requirements.</p>	<p>Goal: Provide recreational opportunities in a variety of physical, social, and operational settings, from primitive, remote landscape to front-country landscape, which allows visitors to have desired recreational experiences and result in associated beneficial outcomes while ensuring the protection of GSENM objects and reducing conflicts with other discretionary uses.</p>			<p>Goal: Provide recreational activities in a variety of physical, social, and administrative settings, from primitive to rural (GSENM), including near-urban (KEPA), which allows visitors to have desired recreational experiences and enjoy the resulting benefits. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Provide opportunities for visitors to use and enjoyment of the area, consistent with resource capabilities, and mandated resource requirements. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Goal: No similar goal.</p>
193.	<p>Goal: No similar goal.</p>	<p>Goals: Recreation by both private and commercial users on GSENM would support a travel and tourism sector that is a source of economic opportunity for the region; management would be consistent with the protection of GSENM objects.</p>			<p>Goals: No similar goal.</p>	<p>Goal: No similar goal.</p>
194.	<p>Objective: Manage SRMAs and RMZs for the distinct, primary recreation-tourism market for which they were created.</p>	<p>Objective: Manage recreation management areas in accordance with prescriptions in Appendix E.</p>			<p>Objective: Manage SRMAs and RMZs for the distinct, primary recreation-tourism market for which they were created. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Objective: SRMAs are areas where more intensive recreation management may be needed because the area will be a focal point for visitation (Highway 12 and 89 corridors) or because recreational uses within the area need to be closely managed or limited to prevent conflicts with Monument resources (Escalante Canyons, Paria/Hackberry, and Fiftymile Mountain).</p>
195.	<p>Objective: Manage use through a range of tools, such as permits, allocations, designated recreation sites, etc.</p>	<p>Objective: No similar management direction.</p>			<p>Objective: Manage use through a range of tools, such as permits, allocations, designated recreation sites, etc. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Objective: Inventories, surveys, and studies will establish baseline data for Monument resources. These data will be used to set up an ongoing monitoring program and to prioritize areas that require more restrictive management. This will be done as part of the adaptive management framework (Chapter 3) with consultation from the GSENM Advisory Committee.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
196.	Objective: Maintain or improve important recreational values and sites in federal ownership to ensure a continued diversity of recreation activities, experiences, and benefits.	Objective: No similar objective.			Objective: Maintain or improve important recreational values and sites in federal ownership to ensure a continued diversity of recreation activities, experiences, and benefits. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
197.	Objective: Provide for public health and safety through mapping and information, facility development, and visitor management.	Objective: No similar objective.			Objective: Provide for public health and safety through mapping and information, facility development, and visitor management. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
198.	Objective: Manage user conflicts between recreation and other resources and uses (such as livestock grazing).	Objective: No similar objective.			Objective: Manage user conflicts between recreation and other resources and uses (such as livestock grazing). (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
199.	Objective: Manage recreational areas and protect objects containing significant scenic, natural, and cultural values as well as areas with scientific importance.	Objective: No similar objective.			Objective: Manage recreational areas and protect objects and resources containing significant scenic, natural, and cultural values as well as areas with scientific importance. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Special Recreation Management Areas (SRMAs) are areas where more intensive recreation management may be needed because the area will be a focal point for visitation (Highway 12 and 89 corridors) or because recreational uses within the area need to be closely managed or limited to prevent conflicts with Monument resources (Escalante Canyons, Paria/Hackberry, and Fiftymile Mountain).

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
	<i>RECREATION MANAGEMENT AREAS</i>					
200.	<p>Management Direction: Designate the following SRMAs:</p> <ul style="list-style-type: none"> • Burr Trail <ul style="list-style-type: none"> ○ Deer Creek RMZ ○ The Gulch RMZ • Calf Creek • Hole-in-the-Rock Road <ul style="list-style-type: none"> ○ Dance Hall Rock RMZ ○ Dry Fork Wash RMZ ○ Devil's Garden RMZ ○ 20-Mile Dinosaur Tracks RMZ ○ Egypt Slot Canyons RMZ • Paria Canyons Vermillion Cliffs • Skutumpah 	<p>Management Direction: Designate the following SRMAs in accordance with prescriptions in Appendix E:</p> <ul style="list-style-type: none"> • Burr Trail Road • Cottonwood Canyon Road • Highway 12 – Escalante to Boulder <ul style="list-style-type: none"> ○ Lower Calf Creek RMZ ○ Middle Calf Creek Watershed RMZ ○ Upper Calf Creek Falls RMZ • Highway 89 • Phipps Death Hollow 	<p>Management Direction: Designate the following SRMAs in accordance with prescriptions in Appendix E:</p> <ul style="list-style-type: none"> • Burr Trail Road • Cottonwood Canyon Road • Egypt • Highway 12 – Escalante to Boulder • Hole-in-the-Rock Road • House Rock Valley Road • Little Desert • North Escalante Canyons • Old Paria • Paria-Hackberry Canyons • Phipps Death Hollow • Skutumpah Road • Spencer Flats-Red Breaks • Toadstools 	<p>Management Direction: Designate the following SRMAs in accordance with prescriptions in Appendix E:</p> <ul style="list-style-type: none"> • Burr Trail Road • Cottonwood Canyon Road • Highway 12 – Escalante to Boulder • Hole-in-the-Rock Road • House Rock Valley • Old Paria • Phipps Death Hollow • Skutumpah Corridor • Spencer Red Breaks • Toadstools 	<p>Management Direction: Designate the following SRMAs:</p> <ul style="list-style-type: none"> • Calf Creek SRMA • Burr Trail SRMA • Hole-in-the-Rock Road SRMA 	<p>Management Direction: The Escalante Canyons, Paria/Hackberry, and Paria Canyons and Plateaus will continue to be managed as Special Recreation Management Areas. Fiftymile Mountain, the Highway 12 Corridor, and the U.S. Highway 89 Corridor will also be SRMAs.</p>
201.	<p>Management Direction: Designate the following ERMAs in the former GSENM Unit:</p> <ul style="list-style-type: none"> • GSENM <ul style="list-style-type: none"> ○ Cottonwood Road RMZ • KEPA <ul style="list-style-type: none"> ○ Little Desert RMZ ○ Cottonwood Road RMZ 	<p>Management Direction: Designate the following ERMAs in accordance with prescriptions in Appendix E:</p> <ul style="list-style-type: none"> • Buckskin-Five Mile • Circle Cliffs-Wolverine • Escalante Desert • House Rock Valley Road • Kaiparowits Plateau • Little Desert • North Escalante Canyons • Paria-Hackberry Canyons • Skutumpah Terrace – Deer Range 	<p>Management Direction: Designate the following ERMAs in accordance with prescriptions in Appendix E:</p> <ul style="list-style-type: none"> • Buckskin-Five Mile • Circle Cliffs-Wolverine • Escalante Desert • Fiftymile Mountain • Nephi Pasture • Skutumpah Terrace – Deer Range • Smoky Mt. Left Hand Collett Roads • Wahweap-White Rocks 	<p>Management Direction: Designate the following ERMAs in accordance with prescriptions in Appendix E:</p> <ul style="list-style-type: none"> • Egypt • House Rock Valley Road • Little Desert • North Escalante Canyons • Paria Hackberry Canyons • Skutumpah Road • Spencer Flats-Red Breaks 	<p>Management Direction: Designate the following ERMA in the former Grand Staircase Monument Unit:</p> <ul style="list-style-type: none"> • GSENM ERMA <ul style="list-style-type: none"> ○ Cottonwood Road RMZ • KEPA ERMA <ul style="list-style-type: none"> ○ Little Desert RMZ ○ Cottonwood Road RMZ <p>(GSENM ROD 2020; KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
202.	<p>Management Direction: Within SRMAs and RMZs, until implementation-level planning is completed, dispersed vehicle camping would be allowed only in previously disturbed areas along designated routes.</p>	<p>Management Direction: No similar management direction.</p>			<p>Management Direction: Within SRMAs and RMZs, until implementation-level planning is completed, dispersed vehicle camping would be allowed only in previously disturbed areas along designated routes. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
	<i>GSENM-wide Management</i>					
203.	<p>Management Direction: Do not allow campfires in the Escalante and Paria/Hackberry Canyons, No Mans Mesa, and other relict plant areas as they are identified. Also prohibit campfires in archaeological and historic sites, rock shelters, or alcoves.</p>	<p>Management Direction: Same as Alternative A. See campfire prescriptions for RMAs (Appendix E).</p>	<p>Management Direction: The following area management would apply to campfires.</p> <p><u>All Areas:</u></p> <ul style="list-style-type: none"> • Sensitive resource areas may be closed to campfires to protect GSENM objects. <p><u>Front Country Area:</u></p> <ul style="list-style-type: none"> • Campfires are allowed only in designated fire grates. Campfire wood collecting not allowed. Removal of unused imported firewood required. <p><u>Passage Area:</u></p> <ul style="list-style-type: none"> • Campfires are allowed in designated fire grates or fire pans/blankets. Where fire pans/blankets are used, ash removal is recommended. Campfire wood collecting not allowed. Removal of unused imported firewood required. <p><u>Outback Area:</u></p> <ul style="list-style-type: none"> • Campfires are allowed, recommend the use of fire grates or fire pans/blankets. Where fire pans/blankets are used, ash removal is recommended. Allow collection of dead and down wood. Removal of unused imported firewood required. <p><u>Primitive Area:</u></p> <ul style="list-style-type: none"> • Same as outback area with the following addition: • Campfires not allowed below the rims of the Escalante and Paria/Hackberry Canyons, and on No Mans Mesa. Allow collection of dead and down wood where campfires are allowed. 	<p>Management Direction:</p> <ul style="list-style-type: none"> • No fires except in designated fire grates. • Campfire wood collecting not allowed. • Removal of unused imported firewood required. 	<p>Management Direction: Do not allow campfires in the Escalante and Paria/Hackberry Canyons, No Mans Mesa, and other relict plant areas as they are identified. Also prohibit campfires in archaeological and historic sites, rock shelters, or alcoves. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: In addition to the general provisions provided elsewhere for use management, the following provisions apply to hanging gardens and relict areas. Camping, overnight stays, and campfires in these areas [hanging gardens and relict plant communities] will not be allowed.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
204.	Management Direction: Allow camping adjacent to range facilities and isolated water sources unless otherwise posted.	Management Direction: No similar management direction (see camping prescriptions for RMAs [Appendix E]).	Management Direction: Where recreation use creates conflicts at grazing facilities and where the BLM Authorized Officer determines those conflicts merit BLM response, the BLM may limit recreational use to reduce conflicts. Limits may depend on the season of use of the grazing allotment.	Management Direction: No similar management direction: (see camping prescriptions for RMAs [Appendix E]). Allow dispersed camping in areas outside of RMAs.	Management Direction: Allow camping adjacent to range facilities and isolated water sources unless otherwise posted. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: A clarification has been made that authorizations for overnight camping and exceptions to group size limits could be provided for in valid grazing permits if the activity does not involve outfitter and guide operations or special events. These provisions may be necessary for the proper operation of a valid grazing permit and are more appropriately authorized within the terms of that permit rather than in recreational visitor permits.
205.	Management Direction: Develop new parking lots, restrooms, and other recreation facilities along open travel routes or other appropriate areas.	Management Direction: Allow recreation facilities in accordance with RMA prescriptions (Appendix E).	Management Direction: <u>Front Country and Passage Areas:</u> Recreation facilities with utilities or paved surfaces could be provided. <u>Outback Areas:</u> Recreation facilities, in limited cases, would be allowed only where other management direction for resource protection prove to be ineffective. <u>Primitive Area:</u> Recreation facilities would not be provided.	Management Direction: Allow recreation facilities in accordance with RMA prescriptions (Appendix E). For areas outside of RMAs, new recreation facilities would not be provided. Sensitive resource areas may be closed to camping.	Management Direction: Develop new parking lots, restrooms, and other recreation facilities along open travel routes or other appropriate areas. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: In an effort to protect Monument resources and provide economic opportunities in the local communities, major facilities and the services associated with them will be located in these communities, outside the Monument. These include a Monument headquarters in Kanab, an Interagency Office in Escalante, and visitor contact stations in Cannonville, Glendale, and Big Water. Their precise locations will be based on factors such as the availability of infrastructure; economic considerations, including market feasibility; the availability of financing; and managerial concerns. These determinations will be made by the communities and the BLM. Any construction activities associated with these sites are contingent upon funding by Congress. Monument staff will also be available at the Paria Contact Station and at the Anasazi State Park in Boulder.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
206.	Management Direction: No similar management direction.	Management Direction: Signage will be provided as needed for safety, resource protection, identification, orientation, and interpretive/educational purposes.			Management Direction: No similar management direction.	Management Direction: As the focal point for visitation, visitor day-use facilities and signs will be added as necessary for visitor use, safety, and the protection of sensitive resources.
207.	Management Direction: No similar management direction.	Management Direction: Permanent fixed climbing anchors outside of WSAs could be permitted if shown to be consistent with the protection of GSENM objects and they would enhance public safety.		Management Direction: Prohibit new fixed climbing anchors in GSENM.	Management Direction: No similar management direction.	Management Direction: The BLM will work with the public to identify climbing areas and develop specific management plans for them. Criteria for designation of climbing areas will be established for the Monument.
208.	Management Direction: No similar management direction.	Management Direction: Canyoneering, rappelling, and climbing restrictions: <ul style="list-style-type: none"> • Not allowed in paleontological and archeological sites, natural bridges, arches, and flowing or active waterfalls. • Special Status Species habitat would be closed as needed to protect species. • Areas may be buffered or seasonally closed to prevent disturbance to raptor nesting. 			Management Direction: No similar management direction.	Management Direction: <ul style="list-style-type: none"> • Climbing will not be allowed in archaeological sites, on natural bridges or arches, or within identified threatened and endangered species nesting areas. • Climbing areas may be seasonally closed to assure that disturbance to raptor nesting activities does not occur. • The BLM will work with the public to identify climbing areas and develop specific management plans for them. Criteria for designation of climbing areas will be established for the Monument. • Climbing will be subject to zone and other specific management restrictions.

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	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
209.	<p>Management Direction: Create campgrounds or designated dispersed camping areas to support management goals and objectives for other resources.</p> <p>Prohibit camping in alcoves, adjacent to rock writing sites, and within historic or prehistoric sites listed or eligible for listing on the National Register of Historic Places (National Register). Additional camping restrictions may be included on SRPs to reduce or eliminate impacts on archaeological sites.</p>	<p>Management Direction: Allow camping in accordance with RMA prescriptions (Appendix E). Sensitive resource areas may be closed to camping consistent with the protection of GSENM objects.</p>	<p>Management Direction: <u>All Areas:</u> Allow camping in accordance with RMA prescriptions (Appendix E). Sensitive resource areas outside of RMAs may be closed to camping.</p> <p><u>Front Country Area:</u> Allow camping only in developed campgrounds.</p> <p><u>Passage Area:</u> Allow camping only in developed campgrounds or designated camping areas.</p> <p><u>Outback and Primitive Areas:</u> Allow dispersed camping. Designated dispersed camping areas may be identified and designated on an as-needed basis. Areas may be closed to camping to protect GSENM objects.</p>	<p>Management Direction: Allow camping in accordance with RMA prescriptions (Appendix E). For areas outside of RMAs, camping is allowed. Sensitive resource areas may be closed to camping.</p>	<p>Management Direction: Create campgrounds or designated dispersed camping areas to support management goals and objectives for other resources. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Prohibit camping in alcoves, adjacent to rock art sites, and within historic or prehistoric sites listed or eligible for listing on the National Register. Additional camping restrictions may be included on SRPs to reduce or eliminate impacts on archaeological sites. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Allow camping in developed campgrounds or in designated primitive camping areas in the front country and passage zones. Prohibit dispersed primitive camping in these zones.</p>
210.	<p>Management Direction: Prohibit nonmotorized/nonmechanized cross-country competitive events. Allow nonmotorized/mechanized competitive events only along designated routes.</p>	<p>Management Direction: Nonmotorized competitive events on designated routes may be considered by the authorizing officer. For group size limitations, see RMA prescriptions in Appendix E.</p> <p>Prohibit motorized competitive events.</p>	<p>Management Direction: <u>All Areas:</u> Prohibit competitive motorized events.</p> <p><u>Front Country, Passage, and Outback Areas:</u> Same as Alternative B.</p> <p><u>Primitive Areas:</u> Same as Alternative D.</p>	<p>Management Direction: Prohibit all competitive events.</p>	<p>Management Direction: Prohibit nonmotorized/nonmechanized cross-country competitive events. Allow nonmotorized/mechanized competitive events only along designated routes (GSENM ROD 2020).</p> <p>Allow nonmotorized/nonmechanized cross-country competitive events on a case-by-case basis. Allow mechanized cross-country competitive events on a case by-case basis (KEPA ROD 2020).</p>	<p>Management Direction: No competitive events will be allowed.</p>
211.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Multi-year SRPs are subject to annual review to ensure the continued consistency with recreational objectives and the protection of GSENM objects.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
212.	<p>Management Direction: Limit motorized and mechanized events to areas designated for motorized and mechanized use.</p>	<p>Management Direction: Motorized and nonmotorized SRPs on designated routes may be considered by the authorizing officer. For group size limitations, see RMA prescriptions in Appendix E.</p>	<p>Management Direction: <u>For all Areas:</u> Group sizes will conform with the requirements of the most restrictive area in which the event occurs. SRPs will be issued for noncompetitive events with the following limitations:</p> <p><u>Front Country and Passage Areas:</u></p> <ul style="list-style-type: none"> • Maximum of 15 vehicles per group on any given route. <p><u>Outback Area:</u></p> <ul style="list-style-type: none"> • Maximum of 15 vehicles per group on any given route. • Prohibit SRPs that provide for intentional visitation to cultural sites, except for approved visitation to designated public cultural sites or sites approved by the BLM. <p><u>Primitive Area:</u></p> <ul style="list-style-type: none"> • Prohibit noncompetitive motorized SRP events. • Prohibit SRPs that provide for intentional visitation to cultural sites, except for approved visitation to designated public cultural sites or approved sites by the BLM. • Limit the number of SRPs to ensure that an undeveloped, primitive, and self-directed visitor experience is achieved. 	<p>Management Direction: Prohibit motorized noncompetitive SRPs. Allow for nonmotorized SRPs with the following limitations:</p> <ul style="list-style-type: none"> • Prohibit SRPs that provide for intentional visitation to cultural sites, except for approved visitation to designated public cultural sites or approved sites by the BLM. • Limit the number of SRPs in WSAs and lands being managed to protect wilderness characteristics to ensure that an undeveloped, primitive, and self-directed visitor experience is achieved. 	<p>Management Direction: Limit motorized and mechanized events to areas designated for motorized and mechanized use. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Special events may be approved, under permit, if the event meets other zone requirements and Plan provisions.</p> <p>Special events will be permitted in accordance with the requirements of the most restrictive zone that the event encounters.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
213.	<p>Management Direction: Where appropriate, group size limits are identified for individual SRMAs and RMZs. Where necessary, the agency may modify these decisions. For example, more restrictive group size limits may be necessary to be consistent with the management of NPS units or to protect opportunities for solitude or primitive and unconfined recreation in certain WSAs. Group size limits also may be adjusted to protect other resource values like riparian or wildlife resources.</p> <p>Within WSAs, group size will be limited to 25 people unless otherwise noted in SRMA/RMZ management actions. Groups over 25 would require approval from the BLM Authorized Officer. Group size limits in WSAs supersede ERMA, SRMA, and RMZ group size limits. On a case-by-case basis, group size limits, where applicable, could be adjusted within WSAs for consistency with group size limits on adjacent lands (such as NPS land and KFO land).</p>	<p>Management Direction: Limit group size in accordance with RMA prescriptions (Appendix E). Exceptions to group size limits would be considered as part of an SRP on a case-by-case basis approved by the BLM Authorized Officer. Group size limits may also be adjusted to protect other resource values like riparian, vegetation, or wildlife resources.</p> <p>Within WSAs, group size will be limited to 25 people unless further restricted in SRMA/RMZ management actions.</p>	<p>Management Direction: Group size limits as follows.</p> <p><u>Front Country Area:</u></p> <ul style="list-style-type: none"> • 75 individuals <p><u>Passage Area:</u></p> <ul style="list-style-type: none"> • 25 individuals <p><u>Outback Area:</u></p> <ul style="list-style-type: none"> • 25 individuals <p><u>Primitive Area:</u></p> <ul style="list-style-type: none"> • 12 individuals <p>Group size limits in SRMAs supersede these allowances.</p> <p>Exceptions to group size limits would be considered as part of an SRP on a case-by-case basis approved by the BLM Authorized Officer.</p>	<p>Management Direction: Limit group size in accordance with RMA prescriptions (Appendix E). For areas outside of RMAs, limit group sizes to 25 individuals.</p>	<p>Management Direction: Where appropriate, group size limits are identified for individual SRMAs and RMZs. Where necessary, the agency may modify these decisions. For example, more restrictive group size limits may be necessary to be consistent with management of NPS units or protect opportunities for solitude or primitive and unconfined recreation in certain WSAs. Group size limits may also be adjusted to protect other resource values like riparian or wildlife resources. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Within WSAs, group size will be limited to 25 people unless otherwise noted in SRMA/RMZ management actions. Groups over 25 would require approval of the authorized officer. Group size limits in WSAs supersede ERMA, SRMA, and RMZ group size limits. On a case-by-case basis, group size limits, where applicable, could be adjusted within WSAs for consistency with group size limits on adjacent lands (such as NPS land, KFO land). (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: Group size will be limited to 25 people in the passage and outback zones. Permits for groups over 25 people will be considered in the passage and outback zones, if the number of people and the activities proposed are consistent with the protection of monument resources. Appropriate NEPA analysis will be prepared on areas where permits could be authorized. These permits will require that adequate sanitation and trash collection are provided, and that activities take place in areas where resources will not be damaged. In the primitive zone, group size will be limited to 12 people and 12 pack animals. Within the Paria River corridor in the primitive zone, permits could be approved for groups over 12 people up to a maximum of 25 people. In order to protect monument resources, it may become necessary to place limits on the overall numbers of people and/or pack animals allowed, or to further restrict group sizes in areas where resource damage is occurring.</p>
214.	<p>Management Direction: Require the use of disposable, self-contained human waste management systems within 300 feet of a water source.</p>	<p>Management Direction: Require the use of personal waste systems within 300 feet of a water source, unless facilities are provided. Or in accordance with RMA prescriptions (Appendix E).</p> <p>Additional areas may be identified based on monitoring visitation use levels and resource impacts.</p>	<p>Management Direction: Require the use of personal waste systems within 300 feet of a water source, unless facilities are provided. Or in accordance with RMA prescriptions (Appendix E).</p> <p>Additional areas may be identified based on monitoring visitation use levels and resource impacts.</p>	<p>Management Direction: Require the use of personal waste systems, unless facilities are provided.</p>	<p>Management Direction: Require the use of disposable, self-contained human waste management systems within 300 feet of a water source. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
215.	Management Direction: No similar management direction.	Management Direction: Require the use of personal waste systems in accordance with RMA prescriptions (Appendix E).		Management Direction: Require the use of personal waste systems, unless facilities are provided.	Management Direction: No similar management direction.	Management Direction: No similar management direction.
216.	Management Direction: Prohibit recreational target shooting within at least 0.25 miles of residences, campgrounds, and developed recreation sites and areas, or greater depending on area-specific conditions.	Management Direction: Prohibit recreational target shooting from, on, or across highways and within 0.25 miles of residences, campgrounds, and developed recreation facilities. Prohibit recreational target shooting in VSAs/ISAs and RNAs (ACECs). These prohibitions do not pertain to the lawful pursuit of game.	Management Direction: <u>Front Country Area:</u> Prohibit recreational target shooting. <u>Passage and Outback Areas:</u> Prohibit recreational target shooting from, on, or across highways and within 0.25 miles of residences, campgrounds, and developed recreation facilities. <u>Primitive Area:</u> Prohibit recreational target shooting. These prohibitions do not pertain to the lawful pursuit of game.	Management Direction: Prohibit recreational target shooting in GSENM. This does not pertain to the lawful pursuit of game.	Management Direction: Prohibit target shooting within at least 0.25 miles of residences, campgrounds, and developed recreation sites and areas, or greater depending on area-specific conditions. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
217.	Management Direction: Prohibit SRP holders from camping within 200 feet of riparian areas. If site-specific analysis can demonstrate that there will be no impacts on riparian vegetation or proper functioning condition, then exceptions could be granted.	Management Direction: No similar management direction.			Management Direction: Prohibit SRP holders from camping within 200 feet of riparian areas. If site-specific analysis can demonstrate that there will be no impacts on riparian vegetation or proper functioning condition, then exceptions could be granted. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
218.	Management Direction: Issuance of an SRP is a discretionary action, consistent with current BLM policy for activities that (1) support recreation and visitor services objectives/ direction, (2) satisfy a public demand that is not being met, and (3) would not cause public health and safety issues. Note: the BLM has discretion over whether to issue an SRP (43 CFR 2932.26).	Management Direction: Allocations for SRPs would be allowed for the protection of GSENM objects, to control crowding, and/or to meet recreational objectives. The following indicators will be used to determine when and where allocation of use need to be made or changed: <ul style="list-style-type: none"> • resource damage (such as proliferation of campsites, human waste problems, social trailing, or vandalism to historical, archaeological, paleontological sites, damage to vegetation, or destruction of biological soil crusts), • conflicts with threatened and endangered plant or animal species • numbers of people and group size • impacts on Tribal Nations' ability to engage in traditional and ceremonial practices 			Management Direction: Issuance of an SRP is a discretionary action, consistent with current BLM policy for activities that (1) support recreation and visitor services objectives/ direction, (2) satisfy a public demand that is not being met, and (3) would not cause public health and safety issues. Note: the BLM has discretion over whether to issue an SRP (43 CFR 2932.26). (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Approve, under permit, special events and commercial operations if the event is consistent with other plan management.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RECREATION AND VISITOR SERVICES				Not for analysis. For comparison only.	
219.	Management Direction: No similar management direction.	Management Direction: Limit recreational stock (pack) in accordance with RMA prescriptions (Appendix E).	Management Direction: Unless otherwise specified for SRMAs/ERMAs/RMZs, limit recreational stock (pack) animals to the following number of pack animals per area: <u>Front Country Area:</u> • 25 animals <u>Passage and Outback Areas:</u> • 25 animals <u>Primitive Area:</u> • 12 animals	Management Direction: Limit recreational stock (pack) in accordance with RMA prescriptions (Appendix E). For areas outside of RMAs, limit recreational stock (pack) to 12 animals.	Management Direction: No similar management direction.	Management Direction: Recreational stock are limited to 12 animals in the primitive zone.
220.	Management Direction: VENDING No similar management direction.	Management Direction: VENDING Vending would be allowed based on prescriptions in associated RMAs.	Management Direction: VENDING <u>Front Country and Passage Areas:</u> Vending would be allowed by permit on a case-by-case basis, in association with approved special events or recreation sites. Generally, permits could be issued to provide services needed at recreation sites (such as firewood sales at campgrounds) and services that are commonly offered in conjunction with permitted special events. Criteria and/or stipulations to protect GSENM objects would be included in all permits. <u>Outback and Primitive Areas:</u> Vending would not be allowed.	Management Direction: VENDING Same as Alternative B.	Management Direction: VENDING No similar management direction.	Management Direction: VENDING Vending within the Monument will be occasional, infrequent, and may be allowed by permit on a case by-case basis in the front country and passage zones, in association with approved special events or recreation sites. Generally, permits could be issued to provide services needed at recreation sites (such as firewood sales at campgrounds) and services that are commonly offered in conjunction with permitted special events. Criteria and/or stipulations to protect Monument resources will be included in all permits. Concessionaire sales and on-going vending permits are not included in this provision, except where contracts between concessionaires and the Monument are used to provide services to visitors in the front country and passage zones. Vending will not be allowed in the outback or primitive zones.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	TRAVEL AND TRANSPORTATION MANAGEMENT				Not for analysis. For comparison only.	
221.	<p>Goal: Establish a transportation system that contributes to protection of sensitive resources (such as wildlife habitat, riparian areas, and cultural resources), accommodates a variety of uses, and minimizes user conflicts.</p>	<p>Goal: Provide appropriate access to GSENM while ensuring the protection, restoration, and/or increased resiliency of GSENM objects.</p>			<p>Goal: Establish a transportation system that contributes to protection of sensitive resources (such as wildlife habitat, riparian areas, and cultural resources), accommodates a variety of uses, and minimizes user conflicts. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Goal: This Plan designates the route system for the Monument. The specific routes shown open for public use are based on a variety of considerations including what is needed to protect Monument resources, implement the planning decisions, and provide for the transportation needs of surrounding communities. The basic philosophy in determining which routes will be open was to determine which routes access some destination (such as scenic overlook, popular camping site, heavily used thoroughfare) and present no significant threat to Monument resources. These routes will be open for public use. Routes that were not considered necessary or desirable (for resource protection purposes) will not be kept open for motorized and mechanized public access. In the event that Title 5 ROWs are issued or in the event of legal decisions on RS 2477 assertions, routes will be governed under the terms of these actions.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	TRAVEL AND TRANSPORTATION MANAGEMENT				Not for analysis. For comparison only.	
222.	<p>Objective: Establish OHV management areas that guide the establishment of a transportation system that provides access to public land resources, provides connectivity to other lands and communities, and provides for experiences compatible with the protection of GSENM objects.</p> <p>Sustain compatible traditional, current, and future use of the land by establishing a route system that contributes to protection of sensitive resources, accommodates a variety of uses, and minimizes user conflicts.</p> <p>Consider public access, resource management, and regulatory needs through transportation planning, incorporating consideration of access needs and the effects of and interaction among all forms of travel, including OHV, mechanized, and nonmotorized/mechanized travel.</p>	<p>Objective: Establish a transportation system that protects GSENM objects (such as wildlife habitat, riparian areas, and cultural resources), provides for appropriate access, and minimizes conflicts among various uses of GSENM.</p>			<p>Objective: Establish OHV management areas that guide the establishment of a transportation system that provides access to public land resources, provides connectivity to other lands and communities, and provides for experiences compatible with the BLM’s multiple-use mission. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Sustain compatible traditional, current, and future use of the land by establishing a route system that contributes to protection of sensitive resources, accommodates a variety of uses, and minimizes user conflicts. (GSENM ROD 2020, KEPA ROD 2020)</p> <p>Consider public access, resource management, and regulatory needs through transportation planning, incorporating consideration of access needs and the effects of and interaction among all forms of travel, including OHV, mechanized, and nonmotorized/mechanized travel. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Objective: No similar objective.</p>

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223.	<p>Management Direction: Any land acquired by the BLM over the life of the RMPs will be managed similarly to the existing OHV area designations of adjoining BLM-managed lands or as stated, or implied, in the transfer. Where clarification is absent, the BLM will manage acquired lands under the OHV limited area designation. The type of limitation will be set by implementation-level decisions; until these decisions are made, use may continue in the same manner and degree consistent with the purposes for which the acquisition was made.</p>				<p>Management Direction: Any land acquired by the BLM over the life of the RMPs will be managed similarly to the existing OHV area designations of adjoining BLM lands or as stated, or implied, in the transfer. Where clarification is absent, the BLM will manage acquired lands under the OHV limited area designation. The type of limitation will be set by implementation-level decisions; until these decisions are made, use may continue in the same manner and degree consistent with the purposes for which the acquisition was made. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar Management Direction.</p>
224.	<p>Management Direction: Until future travel management planning is complete, consistent with the OHV area designations made through this planning process, allow OHV use on routes identified in the GSENM MMP (BLM 2000), unless otherwise specifically addressed in the 2020 GSENM and KEPA Approved RMPs. While the GSENM MMP identified a route system for GSENM, route designation is an implementation-level decision that the BLM undertakes in a separate NEPA process.</p> <p><u>Future TMP Considerations:</u> During the future travel management planning process, consider designation of OHV use and mechanical transport on primitive routes and ways that existed during the original wilderness inventory and were</p>	<p>Management Direction: Until travel management planning is completed, the route designations in the 2000 MMP and as amended by the 2020 RMPs will apply, unless otherwise modified by this plan (such as OHV closed areas).</p> <p>For routes designated for public use, future travel management planning (that is, designating routes as open, limited, or closed) will consider:</p> <ul style="list-style-type: none"> • Motorized, mechanized, and nonmotorized/nonmechanized route designations. • Reduction of opportunities for motorized and mechanized travel in areas of highly erodible soils. • Reduction of opportunities for motorized travel near petroglyphs, pictographs, and inscriptions or other sensitive cultural sites to reduce impacts. 	<p>Management Direction: Until travel management planning is completed, the route designations in the 2000 MMP and as amended by the 2020 RMPs will apply, unless otherwise modified by this plan (such as OHV closed areas).</p> <p>For routes designated for public use, future travel management planning (that is, designating routes as open, limited, or closed) will consider:</p> <ul style="list-style-type: none"> • Only designating OHV routes, beyond those included in the 2000 GSENM TMP, that would increase public safety and/or enhance protection of GSENM objects. • Motorized, mechanized, and nonmotorized/nonmechanized route designations. • Reduction of opportunities for motorized and mechanized travel in areas of highly erodible soils. 	<p>Management Direction: Until travel management planning is completed, the route designations in the 2000 MMP will apply (that is, the closure of V-Road and Inchworm Arch Road), unless otherwise modified by this plan (such as OHV closed areas).</p> <p>For routes designated for public use, future travel management planning (that is, designating routes as open, limited, or closed) will:</p> <ul style="list-style-type: none"> • Prohibit the designation of OHV routes not included in the 2000 GSENM TMP for public use, as modified by this planning process unless needed for public safety and/or enhance the protection of GSENM objects. • Consider motorized, mechanized, and nonmotorized/nonmechanized route designations. 	<p>Management Direction: Until future travel management planning is complete, consistent with OHV area designations made through this planning process, allow OHV use on routes identified in the GSENM MMP (BLM 2000), unless otherwise specifically addressed in the Final EIS. While the GSENM MMP identified a route system for the monument, route designation is an implementation-level decision that the BLM undertakes in a separate NEPA process.</p> <p><u>Future TMP Considerations:</u> During the future travel management planning process, consider designation of OHV use and mechanical transport on primitive routes and ways that existed during the original wilderne’s inventory and were available for use immediately before the issuance of Presidential Proclamation 6920. The BLM will inventory linear</p>	<p>Management Direction: Base the specific routes shown open for public use on a variety of considerations, including what is needed to protect monument resources, implement the planning decisions, and provide for the transportation needs of surrounding communities. The basic philosophy in determining which routes will be open was to determine which routes access some destination (such as scenic overlook, popular camping site, heavily used thoroughfare) and present no significant threat to monument resources. Keep these routes open for public use. Close routes that were not considered necessary or desirable (for resource protection purposes) to OHV and mechanized public access.</p>

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224. (cont.)	available for use immediately before the issuance of Presidential Proclamation 6920. The BLM will inventory linear transportation features in WSAs and compare them to the original wilderness inventory to determine whether any “new,” unauthorized routes are present. Any routes that were not present during the original inventory must be designated “OHV closed” (except in instances related to the provision of access to valid existing rights and limited to the right holder).	<ul style="list-style-type: none"> • Avoidance of the development of nonmotorized trails near raptor nesting areas. • Appropriate landing areas and landing strips for aircraft. 	<ul style="list-style-type: none"> • Reduction of opportunities for motorized travel near petroglyphs, pictographs, and inscriptions or other sensitive cultural sites to reduce impacts. • Avoidance of the development of nonmotorized trails near raptor nesting areas. • Appropriate landing areas and landing strips for aircraft. 	<ul style="list-style-type: none"> • Eliminate motorized and mechanized travel in areas of highly erodible soils. • Reduce opportunities for motorized travel near petroglyphs, pictographs, and inscriptions or other sensitive cultural sites. • Reduce opportunities for motorized travel if there is or may be adverse effects on historic properties from OHV use, except for routes that would be allowed to remain open with appropriate mitigation. • Close routes if there is or may be adverse effects on tribal sacred sites from OHV use, except for routes that would be allowed to remain open with appropriate mitigation. • Close routes if they do not protect GSENM objects, except for routes that would be allowed to remain open with appropriate mitigation. • Avoid the development of biking trails near raptor nesting areas. • Consider appropriate landing areas and landing strips for aircraft. 	transportation features in WSAs and compare them to the original wilderness inventory to determine whether any “new,” unauthorized routes are present. Any routes that were not present during the original inventory must be designated “OHV closed” (except in instances related to provision of access to valid existing rights and limited to the right holder). (GSENM ROD 2020, KEPA ROD 2020)	(See above.)
225.	Action (Implementation): No similar management direction (Inchworm Arch Road is open to motorized travel).			Action (Implementation): Close Inchworm Arch Road to motorized travel.	Action (Implementation): No similar management direction (Inchworm Arch Road is open to motorized travel).	Action (Implementation): Close Inchworm Arch Road to motorized travel.

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	TRAVEL AND TRANSPORTATION MANAGEMENT				Not for analysis. For comparison only.	
226.	<p>Management Direction: Delineate the planning area into the following travel management areas:</p> <ul style="list-style-type: none"> • Garfield County <ul style="list-style-type: none"> ○ Hole-in-the-Rock Road ○ Circle Cliffs • Kane County • Kaiparowits • Escalante Canyons • Grand Staircase <p>Adjustments to travel management area boundaries may be made prior to conducting implementation travel planning.</p>				<p>Management Direction: Delineate the Planning Area into the following travel management areas:</p> <ul style="list-style-type: none"> • Garfield County <ul style="list-style-type: none"> ○ Hole-in-the-Rock Road ○ Circle Cliffs • Kane County • Kaiparowits • Escalante Canyons • Grand Staircase <p>Adjustments to travel management area boundaries may be made prior to conducting implementation travel planning. (KEPA ROD 2020, GSENM ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
227.	<p>Management Direction: Manage OHV use as follows:</p> <ul style="list-style-type: none"> • Open: 116 acres <ul style="list-style-type: none"> ○ Little Desert RMZ • Limited: 1,860,300 acres • Closed: 2,800 acres <ul style="list-style-type: none"> ○ No Mans Mesa RNA (ACEC) 	<p>Management Direction: Manage OHV use as follows:</p> <ul style="list-style-type: none"> • Open: 0 acres • Limited: 912,500 acres • Closed: 953,100 acres 	<p>Management Direction: Manage OHV use as follows:</p> <ul style="list-style-type: none"> • Open: 0 acres • Limited: 655,700 acres • Closed: 1,209,900 acres 	<p>Management Direction: Manage OHV use as follows:</p> <ul style="list-style-type: none"> • Open: 0 acres • Limited: 226,800 acres • Closed: 1,638,800 acres 	<p>Management Direction: Manage OHV use in GSENM as follows:</p> <ul style="list-style-type: none"> • Open: 116 acres <ul style="list-style-type: none"> ○ Little Desert RMZ • Limited: 1,860,300 acres • Closed: 2,800 acres <ul style="list-style-type: none"> ○ No Mans Mesa RNA (ACEC) <p>(KEPA ROD 2020, GSENM ROD 2020)</p>	<p>Management Direction: Cross-country motorized travel will be prohibited in accordance with 43 CFR 8340 OHV regulations. Use on designated routes is allowed. OHV designations will be either “closed” (in the primitive zone) or “limited to designated routes” (in the front country, passage, and outback zones) (Map 79). These designations are consistent with standard BLM designations provided for in BLM Manual 8340. Vehicles may pull off routes no more than 50 feet for parking and camping in the outback zone, except where prohibited (see the Camping and Forestry Products section for related decisions). No OHV play areas will be designated in the Monument (MMP 2000).</p> <ul style="list-style-type: none"> • Open: 0 acres • Limited: 655,408 acres • Closed: 1,210,137 acres

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228.	Management Direction: Limit mechanized travel and equipment to routes designated specifically for such use and routes where OHV use is allowed.				Management Direction: Limit mechanized travel and equipment to routes designated specifically for such use and routes where OHV use is allowed. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Limit use of bicycles to designated routes and prohibit cross-country travel.
229.	Management Direction: Allow development and maintenance of trails for public safety and protection of resources, or to provide opportunities for visitors.	Management Direction: Consider designating nonmotorized recreational trails (such as hiking and horseback riding) in OHV limited and OHV closed areas.	Management Direction: Consider designating nonmotorized recreational trails (such as hiking and horseback riding) in OHV limited and OHV closed areas, according to the following parameters: <u>Front Country Area:</u> Allow a full range of recreational trails, including paved and nonpaved trails. <u>Passage Area:</u> Allow a range of recreational trails, including only nonpaved trails. <u>Outback Area:</u> Allow nonmotorized recreational trails. <u>Primitive Area:</u> Allow nonmechanized recreation trails only for resource protection and/or public safety.	Management Direction: Consider designating nonmotorized recreational trails (such as hiking and horseback riding) in OHV limited areas. Prohibit designating new nonmotorized recreational trails (such as hiking and horseback riding) in OHV closed areas, unless necessary to enhance protection of GSENM objects.	Management Direction: Allow development and maintenance of trails for public safety and protection of resources, or to provide opportunities for visitors. (KEPA ROD 2020, GSENM ROD 2020)	Management Direction: Allow development and maintenance of trails per zone system.

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230.	<p>Management Direction: Repair, maintain, rehabilitate, and improve routes in accordance with the existing GSENM TMP (BLM 2000) until new TMPs are completed.</p>	<p>Management Direction:</p> <p>Maintenance: Designated routes could be maintained to meet public health and safety needs and/or to protect GSENM objects. Deviations from current route maintenance levels on designated routes, to provide for public health and safety needs and/or to protect GSENM objects, would be considered during plan implementation on a case-by-case basis.</p> <p>Improvements: Improvements to routes, including potential reroutes or alternative alignments, to provide for public health and safety needs and/or to protect GSENM objects. Would be considered during plan implementation on a case-by-case basis, in accordance with agency policy. For purposes of this management action, an “improvement” goes beyond preserving the status quo of the road or trail and includes the widening of the road or trail, the horizontal or vertical alignment of the road or trail, the installation of (as distinguished from cleaning, repair, or replacement in kind of already existing) bridges, culverts, and other drainage structures, as well as any significant changes in the surface composition of the road or trail.</p>			<p>Management Direction: Repair, maintain, rehabilitate, and improve routes in accordance with the existing GSENM TMP (BLM 2000), until new TMPs are completed. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: With the exception of those segments listed below, maintain open routes within the disturbed travel surface area as of the date of this plan; prohibit widening, passing lanes, or other travel surface upgrades. Allow deviations from the current maintenance levels as follows:</p> <ul style="list-style-type: none"> • Hole-in-the-Rock Road: Allow stabilization of washout-prone areas, primarily along the southeastern end, to prevent erosion and sediment loading in drainages. • Smoky Mountain Road: Allow stabilization in the Alvey Wash section to prevent erosion and sediment loading in drainages. • Cottonwood Wash Road: Allow stabilization of washout-prone areas, primarily along the southern section, to prevent erosion and sediment loading in drainages. • Skutumpah Road: Allow new crossing for safety at Bull Valley Gorge, and stabilization of washout-prone areas, primarily along the northern section, to prevent erosion and sediment loading in drainages (MMP 2000).
231.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: As necessary to provide safe passage through GSENM on Hole-in-the-Rock Road, Cottonwood Road, and House Rock Valley Road, RMP implementation decisions will allow necessary improvements that are consistent with the protection of GSENM objects.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

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232.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Motorized aircraft include but are not limited to, fixed wing aircraft, helicopters, powered paragliders, electric aircraft, and unmanned aircraft systems (often referred to as UAS or drones).</p> <p>The landings and takeoffs of motorized aircraft in GSENM would be managed as follows:</p> <ul style="list-style-type: none"> Public use of GSENM for landings and takeoffs of motorized aircraft would be limited to routes designated for such landings and takeoffs in OHV limited areas in future implementation-level decision(s). Public use of GSENM for landings and takeoffs of motorized aircraft would be prohibited within 300 feet of developed recreation sites and areas. Additional prohibitions on public landing/takeoff locations for motorized aircraft may be identified through future decision(s). The agency may authorize case-by-case landings/takeoffs of motorized aircraft through formal permitting processes, where the use is beneficial to protecting GSENM objects. 	<p>Management Direction: <u>Front Country and Passage Areas:</u> Same as Alternative B.</p> <p><u>Outback and Primitive Areas:</u> Same as Alternative D.</p>	<p>Management Direction: Motorized aircraft, include but are not limited to, fixed wing aircraft, helicopters, powered paragliders, electric aircraft, and unmanned aircraft systems (often referred to as UAS or drones). The landings and takeoffs of motorized aircraft in GSENM would be managed as follows:</p> <ul style="list-style-type: none"> Public use of GSENM for motorized aircraft landings and takeoffs would be prohibited. The agency may authorize case-by-case landings and takeoffs of motorized aircraft through formal permitting processes, where the use is beneficial to protecting GSENM objects. 	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

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	LANDS AND REALTY				Not for analysis. For comparison only.	
233.	Goal: Manage ROWs, land tenure adjustments, withdrawals, and use of BLM-managed surface lands to meet the needs of internal and external customers and to preserve important resource values.	Goal: Manage discretionary ROWs/land use authorizations to be consistent with the protection of GSENM objects.		Goal: Manage discretionary ROWs/land use authorizations to support the enhanced protection of GSENM objects.	Goal: Manage ROWs, land tenure adjustments, withdrawals, and use of BLM-administered surface lands to meet the needs of internal and external customers and to preserve important resource values. (GSENM ROD 2020, KEPA ROD 2020)	Goal: The BLM will work with local communities and utility providers to identify short and long-term community needs for infrastructure which could affect Monument lands and resources.
234.	Goal: No similar goal.	Goal: Consolidate land within GSENM into federal ownership to protect GSENM objects.			Goal: No similar goal.	Goal: No similar goal.
235.	Objective: Disposal of lands within GSENM is not allowed per the Proclamation, except for possibly by exchange that furthers the protective purposes of GSENM.				Objective: Retain in public ownership public lands that enhance multiple-use management, allow access to public lands, contain sensitive or rare resources, or have significant Native American concerns. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
236.	Objective: Acquire lands or interests in lands to complement existing resource values and uses.	Objective: Enhance the protection of GSENM objects, resources, and processes by land exchange and land acquisition from willing landowners.			Objective: Acquire lands or interests in lands to complement existing resource values and uses. (GSENM ROD 2020, KEPA ROD 2020)	Objective: The BLM will consider land exchanges and acquisitions so long as the current owner is a willing participant and so long as the action is in the public interest and is in accordance with other management goals and objectives of this Plan.
237.	Objective: Utilize energy and utility corridors to focus placement of new major ROWs for energy, utility, and transportation systems.	Objective: When possible, place new ROWs in locations that best protect GSENM objects.			Objective: Utilize energy and utility corridors to focus placement of new major ROWs for energy, utility, and transportation systems. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
238.	Objective: Make public lands available for ROWs, permits, and leases. The suitability for these land actions would be judged on a case-by-case basis.	Objective: No similar objective.			Objective: Make public lands available for ROWs, permits, and leases. The suitability for these land actions would be judged on a case-by-case basis. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.

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239.	Objective: Work with nearby communities and other land management agencies to pursue management activities that cooperatively accomplish the objectives of each agency within the constraints of federal law.	Objective: No similar objective.			Objective: Work with nearby communities and other land management agencies to pursue management activities that cooperatively accomplish the objectives of each agency within the constraints of federal law. (GSENM ROD 2020, KEPA ROD 2020)	Objective: Monument managers are committed to working with nearby communities and other land management agencies to pursue management activities which cooperatively accomplish the objectives of each agency within the constraints of federal law.
240.	Management Direction: In accordance with Presidential Proclamation 10286, all lands within GSENM are withdrawn from all forms of entry, location, selection, sale, or other disposition under the public land laws, from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of GSENM. In addition, there are withdrawals that existed prior to the original establishment of GSENM, such as public water reserves, that remain in effect until revoked.				Management Direction: In accordance with Presidential Proclamation 6920, as modified by Presidential Proclamation 9682, all lands within GSENM will continue to be withdrawn from mineral entry. (GSENM ROD 2020)	Management Direction: The Proclamation establishing the Monument withdrew all federal lands and interests in lands within the Monument from entry, location, selection, sale, leasing, or other disposition (except for exchanges that further the protective purposes of the Monument) under the public land laws, including the mineral leasing and mining laws. Thus, no new federal mineral leases or prospecting permits may be issued, nor may new mining claims be located within the Monument.

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241.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Where there are valid and existing nonmineral authorizations, their uses will be allowed subject to the terms and conditions of the authorizing document. Where these uses conflict with the protection of GSENM objects, and where legally possible, nonmineral authorizations will be adjusted to eliminate or minimize adverse impacts.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: There are situations, unrelated to minerals, in which the BLM has authorized some use of public land, or has conveyed some limited interest in public land. The authorization may be valid, existing when the Monument was designated, and may convey some "right" or interest. Many ROWs, easements, and leases granted on public land are in this category. They vary from case-to-case, but the details of each one are specified in the authoring document. These authorizations, where they are valid and existed when the Monument was established, will be recognized in the Monument and their uses will be allowed subject to the terms and conditions of the authorizing document. Where these uses conflict with the protection of Monument resources, and where legally possible, leases, permits, or easements will be adjusted to eliminate or minimize adverse impacts.</p>
	LAND TENURE					
242.	<p>Management Direction: Retain habitat for listed threatened, endangered, and candidate species in federal ownership unless land tenure adjustments would result in a net increase of habitat or benefit the species and further the protective purposes of GSENM. All actions involving listed species, or their habitat require consultation with the USFWS.</p>	<p>Management Direction: No similar management direction (disposal of lands within GSENM is not allowed per the Proclamation, except for possibly by exchange that furthers the protective purposes of GSENM).</p>			<p>Management Direction: Retain habitat for listed threatened, endangered, and candidate species in federal ownership unless land tenure adjustments would result in a net increase of habitat or benefit the species. All actions involving listed species, or their habitat require consultation with the USFWS. (KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

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243.	<p>Management Direction: Consider land exchanges and acquisitions so long as the current owner is a willing participant and so long as the action is in the public interest and it is in accordance with other management goals and objectives of this plan. In the case of land exchanges, the exchange must also further the protective purposes of GSENM. The action must also result in a net gain of objects within GSENM, such as wildlife habitat, cultural sites, riparian areas, live water, threatened or endangered species habitat, or areas key to the maintenance of productive ecosystems. Priority will be given to actions that meet one or more of the following criteria:</p> <ul style="list-style-type: none"> • Ensures the accessibility of public lands in areas where access is needed and cannot otherwise be obtained. • Is essential to allow effective management of public lands. • Results in the acquisition of lands that serve a national priority as identified in National policy directives. All land exchanges and acquisitions will be subject to valid existing rights as determined by the BLM. <p>When evaluating whether exchange or acquisition of a particular parcel is appropriate, the increase or decrease of public access for outdoor recreation— including hunting and fishing—will be considered in accordance with Secretarial Order 3373 or current directives.</p>	<p>Management Direction: Acquire private inholding lands or interests in lands, by exchange, purchase, or donation, from any willing seller identified within GSENM.</p>			<p>Management Direction: Consider land exchanges and acquisitions so long as the current owner is a willing participant and so long as the action is in the public interest and is in accordance with other management goals and objectives of this plan. The action must also result in a net gain of objects and values within GSENM, such as wildlife habitat, cultural sites, riparian areas, live water, threatened or endangered species habitat, or areas key to the maintenance of productive ecosystems. Priority will be given to actions that meet one or more of the following criteria:</p> <ul style="list-style-type: none"> • Ensures the accessibility of public lands in areas where access is needed and cannot otherwise be obtained. • Is essential to allow effective management of public lands. • Results in the acquisition of lands that serve a national priority as identified in National policy directives. All land exchanges and acquisitions will be subject to valid existing rights as determined by the BLM. <p>When evaluating whether exchange or acquisition of a particular parcel is appropriate, the increase or decrease of public access for outdoor recreation— including hunting and fishing—will be considered in accordance with Secretarial Order 3373 or current directives. (GSENM ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

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244.	<p>Management Direction: To be considered for acquisition or exchange, lands must meet one or more of the following land tenure criteria. The adjustment:</p> <ol style="list-style-type: none"> 1. Is in the public interest and accommodates needs of state, local, or private entities, including needs for the economy, community growth, and expansion. 2. Results in a net gain of important and manageable resource values on public lands, such as crucial wildlife habitat, cultural sites, high-value recreation areas, high-quality riparian areas, live water, threatened and endangered species habitat, or areas key to maintaining productive ecosystems. 3. Ensures accessibility of public lands in areas where access is needed and cannot otherwise be obtained. 4. Is essential to allow effective management of public lands in areas where consolidation of ownership is necessary to meet resource management objectives; and 5. Results in acquisition of lands that serve a national priority as identified in national policy directives. 				<p>Management Direction: To be considered for any form of land tenure adjustment (including but not limited to exchanges, Recreation and Public Purposes Act, acquisitions, etc. [except FLPMA 203 Sales]), public lands in the Planning Area must meet one or more of the following land tenure criteria. The adjustment:</p> <ol style="list-style-type: none"> 1. Is in the public interest and accommodates needs of State, local, or private entities, including needs for the economy, community growth, and expansion, and is in accordance with other land use goals, objectives, and RMP planning decisions. 2. Results in a net gain of important and manageable resource values on public lands, such as crucial wildlife habitat, cultural sites, high-value recreation areas, high-quality riparian areas, live water, threatened and endangered species habitat, or areas key to maintaining productive ecosystems. 3. Ensures accessibility of public lands in areas where access is needed and cannot otherwise be obtained. 4. Is essential to allow effective management of public lands in areas where consolidation of ownership is necessary to meet resource management objectives; and 5. Results in acquisition of lands that serve a national priority as identified in national policy directives. <p>All future land tenure adjustments will require a site-specific environmental analysis in accordance with NEPA when an actual land tenure adjustment action is proposed.</p>	<p>Management Direction: Consider land exchanges and acquisitions so long as the current owner is a willing participant and so long as the action is in the public interest and is in accordance with other management goals and objectives of this plan. The action must also result in a net gain of objects and values within GSENM, such as wildlife habitat, cultural sites, riparian areas, live water, threatened or endangered species habitat, or areas key to the maintenance of productive ecosystems. The action may also meet one or more of the following criteria:</p> <ul style="list-style-type: none"> • Ensures the accessibility of public lands in areas where access is needed and cannot otherwise be obtained; • Is essential to allow effective management of public lands; and • Results in the acquisition of lands that serve a national priority as identified in National policy directives. All land exchanges and acquisitions will be subject to valid existing rights as determined by the BLM.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS AND REALTY				Not for analysis. For comparison only.	
244. (cont.)	(See above.)				<p>All future land tenure adjustments must be in conformance with other goals and objectives in this plan, some of which could preclude land tenure adjustment.</p> <p>All land tenure adjustments will be subject to valid existing rights as determined by the authorized officer.</p> <p>Acquisitions will be managed in a manner consistent with adjacent or comparable public land within the Planning Area.</p> <p>When evaluating whether acquisition or exchange of a particular parcel is appropriate, the increase or decrease of public access for outdoor recreation—including hunting and fishing—will be considered in accordance with Secretarial Order 3373 or current directives. (KEPA ROD 2020)</p>	(See above.)
	ROWS AND ROW CORRIDORS					
245.	<p>Management Direction: Maintain 11,400 acres as designated ROW corridors in the planning area. This includes Section 368 corridor 68-116 and the congressionally designated utility corridor along U.S. Highway 89 in Kane County, which extends 240 feet north and 500 feet south of the highway centerline.</p> <p>Nothing in these plans will prevent the use of the congressionally designated utility corridor along U.S. Highway 89 in Kane County for its designated purpose.</p>	<p>Management Direction: Maintain 11,400 acres as designated ROW corridors. This includes the Section 368 corridor 68-116 and the congressionally designated utility corridor along U.S. Highway 89 (Public Law 105-355) in Kane County, which extends 240 feet north and 500 feet south of the highway centerline.</p>		<p>Management Direction: Maintain 2,800 acres as designated ROW corridors. This includes the congressionally designated utility corridor along U.S. Highway 89 (Public Law 105-355) in Kane County, which extends 240 feet north and 500 feet south of the highway centerline. Undesignate Section 368 corridor 68-116 within GSENM and no longer focus placement of major ROWs in that corridor.</p>	<p>Management Direction: Maintain 11,378 acres as designated ROW corridors in the Planning Area. This includes Section 368 corridor 68-116 and the congressionally designated utility corridor along U.S. Highway 89 in Kane County, which extends 240 feet north and 500 feet south of the highway centerline.</p> <p>Nothing in these plans will prevent the use of the congressionally designated utility corridor along U.S. Highway 89 in Kane County for its designated purpose. (KEPA ROD 2020)</p>	<p>Management Direction: Per Public Law 105-355, signed by President Clinton on October 31, 1998, a utility corridor was designated along U.S. Highway 89 in Kane County, including that portion of U.S. Highway 89 within the Monument. The utility corridor extends 240 feet north from the center line of the highway, and 500 feet south from the center line of the highway. Location of the proposed Lake Powell to Sand Hollow water pipeline within this utility corridor is a possibility. Subsequent NEPA analysis will be required.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS AND REALTY				Not for analysis. For comparison only.	
246.	<p>Allocation: Manage 881,300 acres as ROW exclusion areas (including communication sites).</p>	<p>Allocation: Manage the following areas as ROW exclusion:</p> <ul style="list-style-type: none"> • WSA • Lands managed for protection of lands with wilderness characteristics • RNAs (ACECs) • ACECs • OSNHT National Trail Management Corridor • suitable wild segments of WSR corridors <p>The only exception to the ROW exclusion areas would be to consider, on a case-by-case basis, the granting of a ROW that would provide the minimum necessary function for local emergency services.</p>	<p>Allocation: Manage the following areas as ROW exclusion:</p> <ul style="list-style-type: none"> • All areas identified in Alternative B • Primitive area • All suitable WSR corridors in the outback and primitive areas 	<p>Allocation: Manage the following areas as ROW exclusion:</p> <ul style="list-style-type: none"> • All areas identified in Alternative B • High probability cultural resource areas (according to BLM Class I Existing Information Inventory [Class I Inventory]) • Highest probability for paleontological resources (PFYC 4 and 5) • Designated critical habitat • All suitable WSR corridors 	<p>Allocation: Manage 881,280 acres as ROW exclusion areas (including communication sites).</p>	<p>Allocation: Prohibit utility ROWs in the primitive zone. In cases of extreme need for local (not regional) needs and where other alternatives are not available, a plan amendment could be considered for these facilities in the primitive zone. Communication sites will only be allowed in the primitive zone for safety purposes and where no other alternative exists.</p>
247.	<p>Allocation: Manage 332,800 acres areas as ROW avoidance areas (including communication sites).</p>	<p>Allocation: Manage the following areas as ROW avoidance:</p> <ul style="list-style-type: none"> • High probability cultural resource areas • Priority Habitat Management Area (linear and site-type ROWs) (<i>BLM Utah Greater Sage-grouse RMP Amendment; BLM 2019</i>) • Greater sage-grouse opportunity areas within 4 miles of a lek located in Priority Habitat Management Area (<i>BLM Utah Greater Sage-grouse RMP Amendment; BLM 2019</i>) • All other areas of GSENM are not identified as ROW exclusion or open. <p>To allow a ROW in an avoidance area, the ROW must be the minimum necessary to achieve the ROW's purpose and would not otherwise be feasible in an open area.</p>	<p>Allocation: Manage the following areas as ROW avoidance:</p> <ul style="list-style-type: none"> • High probability cultural resource areas • Priority Habitat Management Area (linear and site-type ROWs) (<i>BLM Utah Greater Sage-grouse RMP Amendment; BLM 2019</i>) • Greater sage-grouse opportunity areas within 4 miles of a lek located in Priority Habitat Management Area (<i>BLM Utah Greater Sage-grouse RMP Amendment; BLM 2019</i>) • Front country, passage, and outback areas not identified as ROW exclusion or open. <p>To allow a ROW in an avoidance area, the ROW must be the minimum necessary to achieve the ROW's purpose and would not otherwise be feasible in an open area.</p>	<p>Allocation: Manage the following areas as ROW avoidance:</p> <ul style="list-style-type: none"> • Priority Habitat Management Area (linear and site-type ROWs) (<i>BLM Utah Greater Sage-grouse RMP Amendment; BLM 2019</i>) • Greater sage-grouse opportunity areas within 4 miles of a lek located in Priority Habitat Management Area (<i>BLM Utah Greater Sage-grouse RMP Amendment; BLM 2019</i>) • All other areas of GSENM are not identified as ROW exclusion or open. <p>To allow a ROW in an avoidance area, the ROW must be compatible and enhance the protection of GSENM objects and would not otherwise be feasible in an open area.</p>	<p>Allocation: Manage 354,084 acres areas as ROW avoidance areas (including communication sites).</p>	<p>Allocation: Allow communication sites and utility ROWs in the outback zone within the constraints of the zone, where no other reasonable location exists, and will meet the visual objectives (see the Visual Resources, Night Skies, and Natural Soundscapes section for related decisions).</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS AND REALTY				Not for analysis. For comparison only.	
248.	Management Direction: Manage 21,100 acres as ROW seasonal avoidance areas for the seasonal mule deer migration corridor along Highway 89.	Management Direction: Manage ROWs that have a common boundary with the Highway 89 fenced UDOT ROW as a seasonal avoidance area within the seasonal mule deer migration corridor (October 1 to April 30). No new ROW construction or maintenance would occur within this area during this timeframe.			Management Direction: Manage 21,112 acres as ROW seasonal avoidance areas for the seasonal mule deer migration corridor along Highway 89. (KEPA ROD 2020)	Management Direction: No similar management direction.
249.	Allocation: Manage 630,400 acres as ROW open areas (including communication sites).	Allocation: Manage the following areas as open for ROW location: • Areas with existing utility ROWs • Designated Utility Corridors	Allocation: Manage the following areas as open for ROW location: • Section 368 corridor 68-116 • Congressionally designated utility corridor along Highway 89 (Public Law 105-355)	Allocation: Manage the following areas as open for ROW location: • Congressionally designated utility corridor along Highway 89 (Public Law 105-355)	Allocation: Manage 630,881 acres as ROW open areas (including communication sites). (GSENM ROD 2020; KEPA ROD 2020)	Allocation: In the front country and passage zones, communication sites and utility ROWs will be allowed, but they will have to meet visual resource objectives (see the Visual Resource Management section for related decisions).
250.	Management Direction: No similar management direction.	Management Direction: Allow renewal or upgrades of existing new facilities authorized under a ROW/land use authorization in GSENM.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
251.	Management Direction: No similar management direction.	Management Direction: Applicants must clearly demonstrate that no feasible off-GSENM alternatives exist for placement of facilities prior to analyzing placement within GSENM, except in designated utility corridors.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
252.	Management Direction: Authorize only one access route to private land parcels unless public safety or local ordinances warrant additional routes. Private landowners must coordinate the development of access routes across public lands to prevent a proliferation of routes.	Management Direction: Authorize only one reasonable access route to private land parcels unless public safety warrants additional routes.			Management Direction: Authorize only one access route to private land parcels unless public safety or local ordinances warrant additional routes. Private landowners must coordinate the development of access routes across public lands in order to prevent a proliferation of routes. (GSENM ROD 2020)	Management Direction: The BLM will authorize only one access route to private land parcels unless public safety or local ordinances warrant additional routes. Private landowners will be required to coordinate the development of access routes across public lands in order to prevent a proliferation of routes. ROWs may be allowed when necessary to exercise valid existing rights.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	LANDS AND REALTY				Not for analysis. For comparison only.	
253.	<p>Management Direction: Authorize communication site facilities in areas open to new ROWs.</p>	<p>Management Direction: No similar management direction (follow avoidance/exclusion/open allocations above).</p>			<p>Management Direction: Authorize communication site facilities in areas open to new ROWs. (GSENM ROD 2020)</p>	<p>Management Direction: In the front country and passage zones, communication sites and utility ROWs will be allowed, but will have to meet visual resource objectives (see the Visual Resource Management section for related decisions).</p> <p>In the outback zone, communication sites and utility ROWs will be allowed within the constraints of the zone, where no other reasonable location exists, and will meet the visual objectives (see the Visual Resource Management section for related decisions).</p> <p>In the primitive zone, utility ROWs will not be permitted. In cases of extreme need for local (not regional) needs and where other alternatives are not available, a plan amendment could be considered for these facilities in the primitive zone. Communication sites will only be allowed in the primitive zone for safety purposes and where no other alternative exists.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RENEWABLE ENERGY				Not for analysis. For comparison only.	
254.	Goal: Manage and provide opportunities for solar, wind, geothermal, and other renewable energy uses consistent with the protection of GSENM objects and in consideration of goals, objectives, and management of other resources.	Goal: Identify and provide opportunities for small-scale renewable energy sources for the purposes of powering facilities in GSENM.			Goal: Manage and provide opportunities for solar, wind, geothermal, and other renewable energy uses in consideration of goals, objectives, and management of other resources. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
255.	Objective: Identify renewable energy variance, avoidance, and exclusion areas.	Objective: No similar objective.			Objective: Identify renewable energy variance, avoidance, and exclusion areas. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
256.	Objective: Provide opportunities for renewable energy development where consistent with the protection of GSENM objects and compatible with other resources.	Objective: Prioritize the use of renewable energy in existing facility upgrades and the construction of new renewable energy facilities where appropriate and compatible with protecting GSENM objects.	Objective: Prioritize the use of renewable energy in existing facility upgrades where appropriate and compatible with protecting GSENM objects.		Objective: Provide opportunities for renewable energy development where compatible with other resources. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
257.	Management Direction: ROW avoidance and exclusion areas also apply to renewable energy development.				Management Direction: ROW avoidance and exclusion areas also apply to renewable energy development. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
258.	Management Direction: Prohibit utility-scale renewable energy development in GSENM.				Management Direction: In the former GSENM boundary: Prohibit (that is, exclude) utility-scale renewable energy development in GSENM. (GSENM ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	AREAS OF CRITICAL ENVIRONMENTAL CONCERN				Not for analysis. For comparison only.	
259.	Goal: No similar goal.	Goal: Protect intact ecosystems' components through designation of ACECs and RNAs (ACECs) that represent the diversity of landscapes and ecosystems across GSENM.		Goal: No similar goal.	Goal: No similar goal.	Goal: No similar goal.
260.	Objective: No similar objective.	Objective: Manage ACECs and RNAs (ACECs) where relevance and importance criteria are met, and special management is required to protect GSENM objects.		Objective: No similar objective.	Objective: No similar objective.	Objective: No ACECs are designated in the 2000 MMP. After careful evaluation of the resources recognized in ACEC nominations, it was determined that their protection will be substantially equivalent under either Monument authority or ACEC designation.
261.	Actions / Allowable Uses No similar management direction.	Actions / Allowable Uses Designate the Warm Creek ACEC (10,800 acres) to protect paleontological resources. No additional special management is needed considering the protections provided by Proclamation 10286.	Actions/Allowable Uses: No similar management direction.		Actions / Allowable Uses No similar management direction.	Actions / Allowable Uses No similar management direction.
262.	Actions / Allowable Uses No similar management direction.	Actions / Allowable Uses Designate the Willis Creek ACEC (22,200 acres) to protect unique geological features and high scenic quality and sensitivity. Manage the ACEC as VRM Class II.	Actions/Allowable Uses: No similar management direction.		Actions / Allowable Uses No similar management direction.	Actions / Allowable Uses No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RESEARCH NATURAL AREAS				Not for analysis. For comparison only.	
263.	Management Direction: No similar management direction.	Management Direction: Designate Little No Mans Mesa RNA (ACEC) (50 acres) to protect vegetation and scientific opportunity. Apply the following management: <ul style="list-style-type: none"> • Unavailable for livestock grazing • Prohibit campfires • Prohibit camping • ROW exclusion • Facilitate scientific research • Prohibit recreational target shooting 		Management Direction: No similar management direction.	Management Direction: No similar management direction.	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	RESEARCH NATURAL AREAS				Not for analysis. For comparison only.	
264.	Management Direction: No similar management direction.	Management Direction: Designate Little Spring Point RNA (ACEC) (30 acres) to protect vegetation and scientific opportunity. Apply the following management: <ul style="list-style-type: none"> • Unavailable for livestock grazing • Prohibit campfires • Prohibit camping • ROW exclusion • Facilitate scientific research • Prohibit recreational target shooting 		Management Direction: No similar management direction.	Management Direction: No similar management direction.	Management Direction: No similar management direction.
265.	Management Direction: No similar management direction.	Management Direction: Designate Fiftymile Mountain RNA (ACEC) (56,800 acres) to protect cultural resources and scientific opportunity. Apply the following management: <ul style="list-style-type: none"> • Camping by permit only • ROW exclusion • Develop a monitoring plan and coordinate with the grazing permittee to identify potential impacts from livestock grazing. The monitoring plan will include adaptive management thresholds that indicate the appropriate level of grazing, including no grazing for the protection of cultural resources in the applicable allotment management plans. • Facilitate scientific research • Prohibit recreational target shooting 		Management Direction: No similar management direction.	Management Direction: No similar management direction.	Management Direction: No similar management direction.
266.	Management Direction: Manage No Mans Mesa RNA (ACEC) (2,800 acres) as follows (GSENM ROD 2020): <ul style="list-style-type: none"> • Unavailable for livestock grazing • Closed to motorized OHV use • Prohibit campfires 	Management Direction: Designate No Mans Mesa RNA (ACEC) (2,800 acres) to protect vegetation resources and scientific opportunity. Apply the following management: <ul style="list-style-type: none"> • Unavailable for livestock grazing • Closed to motorized OHV use • Prohibit camping unless authorized under a research permit • Prohibit campfires • Facilitate scientific research • Prohibit recreational target shooting 		Management Direction: Same as Alternative B.	Management Direction: Manage No Mans Mesa RNA (ACEC) (2,800 acres) as follows (GSENM ROD 2020): <ul style="list-style-type: none"> • Unavailable for livestock grazing • Closed to motorized OHV use • Prohibit campfires 	Management Direction: Same as Alternative A.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMP	2000 Monument Management P
	OUTSTANDING NATURAL AREAS (ONAS) AND RECREATION AREAS				Not for analysis. For comparison only.	
267.	<p>Management Direction: The 2000 MMP and the 2020 RMP erroneously carried forward some of the following areas as ONAs and continued a multiple use classification. However, a 1994 <i>Federal Register</i> notice (59 FR 107, 29205-29206) clarified that the regulations under which these areas were classified are obsolete. Therefore, these areas are not carried forward.</p> <ul style="list-style-type: none"> • The Gulch (3,430 acres) • Escalante Canyons Tracts 1 and 5 (1,160 acres) • North Escalante Canyons Tracts 2, 3, and 4 (5,800 acres) • Phipps-Death Hollow (34,300 acres) • Devil's Garden (640 acres) • Wolverine Petrified Wood Area (1,520 acres) • Calf Creek Recreation Area (5,835 acres) (see <i>Recreation for additional management</i>) • Deer Creek Recreation Area (640 acres) (see <i>Recreation for additional management</i>) • Dance Hall Rock Historic Site (640 acres) 	<p>Management Direction: Do not designate any ONAs.</p>			<p>Management Direction: Other special management designations that existed prior to monument designation, and were retained after monument designation, include:</p> <ul style="list-style-type: none"> • Calf Creek Recreation Area • Deer Creek Recreation Area • Devils Garden Outstanding Natural Area • Dance Hall Rock Historic Site • Escalante Canyons Outstanding Natural Area (tracts 2, 3, and 4 are included in the North Escalante Canyon/The Gulch Instant Study Area [ISA] and tracts 1 and 5 are separate) • North Escalante Canyon Outstanding Natural Area • The Gulch Outstanding Natural Area • Phipps-Death Hollow Outstanding Natural Area • No Mans Mesa RNA (ACEC) • Wolverine Petrified Wood Natural Environmental Area 	<p>Management Direction: All existing special management designations are consistent with the Proclamation and the objectives of this Plan. The following designation will continue:</p> <ul style="list-style-type: none"> • Calf Creek Recreation Area • Deer Creek Recreation Site • Devils Garden Outstanding Natural Area • Dance Hall Rock Historic Site • Escalante Canyons Outstanding Natural Area (tracts 2, 3, 4 are included in North Escalante Canyon/The Gulch ISA and Tract 1 and 5 are separate) • North Escalante Canyon Outstanding Natural Area • The Gulch Outstanding Natural Area • Phipps-Death Hollow Outstanding Natural Area • No Mans Mesa RNA (ACEC) • Wolverine Petrified Wood Natural Environmental Area

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	NATIONAL HISTORIC TRAILS				Not for analysis. For comparison only.	
268.	Goal: Promote the preservation and appreciation of the OSNHT for the enjoyment of the American people.	Goal: Promote the preservation and appreciation of the OSNHT.			Goal: Promote the preservation and appreciation of the OSNHT for the enjoyment of the American people. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar management direction.
269.	Objective: Identify and manage an appropriate trail management corridor for the OSNHT.	Objective: No similar objective.			Objective: Identify and manage an appropriate trail management corridor for the OSNHT. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar management direction.
270.	Objective: Manage the landscape (viewshed) associated with the OSNHT so that visitors continue to get a sense of how this landscape influenced commercial trade along the trails.	Objective: Manage the OSNHT so that visitors continue to get a sense of how this landscape contributed to the use of the trail.			Objective: Manage the landscape (viewshed) associated with the OSNHT so that visitors continue to get a sense of how this landscape influenced commercial trade along the trails. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar management direction.
271.	Management Direction: Establish an OSNHT National Trail Management Corridor along the Box of the Paria High-Potential Segment, to include lands up to 0.5 miles on either side of the OSNHT centerline or within the viewshed, whichever is less. Prohibit discretionary uses that would substantially interfere with the nature and purposes of the OSNHT.	Management Direction: Establish an OSNHT National Trail Management Corridor, as informed by the OSNHT inventory. Prohibit discretionary uses that would substantially interfere with the nature and purposes of the OSNHT.			Management Direction: Establish an OSNHT National Trail Management Corridor along the Box of the Paria High-Potential Segment, to include lands up to 0.5 miles on either side of the OSNHT centerline or within the viewshed, whichever is less. (GSENM ROD 2020, KEPA 2020) Manage the designated OSNHT National Trail Management Corridor as follows: Allow mineral leasing subject to controlled surface use stipulation. (KEPA ROD 2020)	Management Direction: No similar management direction.
272.	Management Direction: Manage High-Potential Sites and Segments per the National Trails System Act as follows: • Allow discretionary uses that would be compatible with the protection of the purpose and nature, resources, qualities, values, and settings of the OSNHT.	Management Direction: Manage OSNHT as ROW exclusion.			Management Direction: Manage High-Potential Sites and Segments per the National Trails System Act as follows: • Allow discretionary uses that would be compatible with the protection of the purpose and nature, resources, qualities, values, and settings of the OSNHT. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SCENIC BYWAYS				Not for analysis. For comparison only.	
273.	Goal: Manage designated scenic routes to protect values for which they were established.	Goal: Protect and enhance the values for which scenic byways were designated.			Goal: Manage designated scenic routes to protect values for which they were established. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
274.	Objective: Continue to coordinate management of National Scenic Byways, Utah Scenic Byways, and Utah Scenic Backways with other agencies, BLM offices, and local and state governments, as appropriate.	Objective: Manage designated scenic routes to provide for an enjoyable visitor experience.			Objective: Continue to coordinate management of National Scenic Byways, Utah Scenic Byways, and Utah Scenic Backways with other agencies, BLM offices, and local and state governments as appropriate. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
275.	Management Direction: Consider currently designated Utah Scenic Byways as Scenic or Back Country Byways.	Management Direction: Consider BLM Back Country Byways designation for Utah State Scenic Backways and Skutumpah Road.			Management Direction: Consider currently designated Utah Scenic Byways as Scenic or Back Country Byways. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.
276.	Management Direction: No similar management direction.	Management Direction: Manage viewsheds along designated (federal, state, or BLM) scenic byways as VRM Class II in the foreground/middle ground distance area.	Management Direction: Manage a 5-mile corridor from designated (federal, state, or BLM) byway centerlines as VRM Class II.		Management Direction: No similar management direction.	Management Direction: No similar management direction.
277.	Management Direction: Do not consider new BLM Back Country Byways.	Management Direction: No similar management direction.			Management Direction: Do not consider new BLM Back Country Byways. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILD AND SCENIC RIVERS				Not for analysis. For comparison only.	
278.	Goal: Preserve eligible or suitable rivers, or segments of rivers, and their immediate environments in their free-flowing condition for the protection of their ORVs and for the benefit and enjoyment of present and future generations, giving consideration to other resource values and uses.				Goal: Preserve eligible or suitable rivers, or segments of rivers, and their immediate environments in their free-flowing condition for the protection of their ORVs and for the benefit and enjoyment of present and future generations, giving consideration to other resource values and uses. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILD AND SCENIC RIVERS				Not for analysis. For comparison only.	
279.	<p>Management Direction: The following river segments in GSENM have been determined suitable and recommended for Congressional designation into the National Wild and Scenic Rivers System. The suitable river segments, classifications, and miles are³:</p> <p><i>Escalante River System</i></p> <ul style="list-style-type: none"> • Escalante River #1; Wild • Escalante River #2; Recreational • Escalante River #3; Wild • Harris Wash; Wild • Lower Boulder Creek; Wild • Slickrock Canyon; Wild • Lower Deer Creek #1; Recreational • Lower Deer Creek #2; Wild • The Gulch #1; Wild • The Gulch #2; Recreational • The Gulch #3; Wild • Steep Creek; Wild • Lower Sand Creek; Wild • Willow Patch Creek; Wild • Mamie Creek and West Tributary; Wild • Death Hollow Creek; Wild • Calf Creek #1; Wild • Calf Creek #2; Scenic • Calf Creek #3; Recreational • Twenty-five-mile Wash; Wild <p><i>Paria River System</i></p> <ul style="list-style-type: none"> • Upper Paria River #1; Recreational • Upper Paria River #2; Recreational 	<p>Management Direction: Same as Alternative A, with the change in classification of:</p> <ul style="list-style-type: none"> • Upper Paria River #1; Wild • Lower Sheep Creek; Wild 			<p>Management Direction: Approximately 224 miles of river segments in GSENM have been determined suitable and recommended for Congressional designation into the National Wild and Scenic Rivers System. The suitable river segments, classifications, and miles are:⁴</p> <ul style="list-style-type: none"> • Escalante River #1; Wild • Escalante River #2; Recreational • Escalante River #3; Wild • Harris Wash; Wild • Lower Boulder Creek; Wild • Slickrock Canyon; Wild • Lower Deer Creek #1; Recreational • Lower Deer Creek #2; Wild • The Gulch #1; Wild • The Gulch #2; Recreational • The Gulch #3; Wild • Steep Creek; Wild • Lower Sand Creek; Wild • Willow Patch Creek; Wild • Mamie Creek and West Tributary; Wild • Death Hollow Creek; Wild • Calf Creek #1; Wild • Calf Creek #2; Scenic • Calf Creek #3; Recreational • Twenty-five-mile Wash; Wild • Upper Paria River #1; Recreational • Upper Paria River #2; Recreational • Lower Paria River #1; Recreational • Deer Creek Canyon; Wild • Snake Creek; Wild 	<p>Management Direction: Approximately 252 miles of river segments have been determined suitable and will be recommended for Congressional designation into the National Wild and Scenic Rivers System. The suitable river segments include⁵:</p> <ul style="list-style-type: none"> • Escalante River 1, 2, 3; • Harris Wash; • Lower Boulder Creek; • Slickrock Canyon; • Lower Deer Creek 1, 2; • The Gulch 1, 2, 3; • Steep Creek; • Lower Sand Creek and tributary Willow Patch Creek; • Mamie Creek and west tributary; • Death Hollow Creek; • Calf Creek 1, 2, 3; • Twenty-five Mile Wash; • Upper Paria River 1, 2; • Lower Paria River 1, 2; • Deer Creek Canyon; • Snake Creek; Hogeeye Creek; • Kitchen Canyon; • Starlight Canyon; • Lower Sheep Creek; • Hackberry Creek; • Lower Cottonwood Creek; • Buckskin Gulch/Wire Pass

³ Suitability determinations were made as part of the 1999 Monument Management Planning effort. The 2020 GSENM and KEPA Approved Plans maintained the suitability determinations, but changed the classifications for the Upper Paria River #1 and Lower Sheep Creek segments.

⁴ *Id.*

⁵ The 1999 Monument Management Planning effort also identified Lower Paria River #2 and Buckskin Gulch/Wire Pass as suitable, but they are outside of GSENM, so they are not brought forward into the alternatives.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILD AND SCENIC RIVERS				Not for analysis. For comparison only.	
279. (cont.)	<ul style="list-style-type: none"> • Lower Paria River #1; Recreational • Deer Creek Canyon; Wild • Snake Creek; Wild • Hogeye Creek; Wild • Kitchen Canyon; Wild • Starlight Canyon; Wild • Lower Sheep Creek; Recreational • Hackberry Creek; Wild • Lower Cottonwood Creek; Recreational 	(See above.)			<ul style="list-style-type: none"> • Hogeye Creek; Wild • Kitchen Canyon; Wild • Starlight Canyon; Wild • Lower Sheep Creek • Hackberry Creek; Wild • Lower Cottonwood Creek; Recreational (GSENM ROD 2020, KEPA ROD 2020)	(See above.)
280.	Management Direction: Manage suitable segments for their free-flowing condition, identified tentative classification, and preservation of ORVs.	Management Direction: Manage rivers determined as suitable for designation under the Wild and Scenic Rivers Act, or segments of such rivers, within 0.25 miles of the ordinary high-water mark on each side of the river, for their free-flowing condition, water quality, tentative classification, and any ORVs until, a decision on suitability can be made for identified eligible rivers, or in the case of suitable rivers, until Congress designates the river or releases it for other uses.			Management Direction: Manage suitable segments for their free-flowing condition, identified tentative classification, and preservation of ORVs. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: Those streams found suitable will be managed for protection of the resources associated with the stream. Such action will not entail any additional state water rights and will not result in a federal reserved water right unless Congress acts to officially designate the stream or stream segment as part of the National Wild and Scenic Rivers System. Upon such designation, if any, the federal reserved water right thus established would, by law, be established with the priority date of the designation and would be junior to all preexisting water rights, in accordance with the existing state priority system. Senior rights in any stream designated would be unaffected.
281.	Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • Avoid ROWs (including communication sites) in all suitable WSR corridors, except in designated utility corridors. 	Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • ROW exclusions in all suitable wild segments of WSR corridors. • ROW avoidance in all suitable scenic and recreational segments of WSR corridors, except in designated utility corridors. 	Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • ROW exclusions in all suitable WSR corridors in the outback and primitive areas. • ROW avoidance in all other suitable WSR corridors, except in designated utility corridors. 	Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • ROW exclusions in all suitable WSR corridors, except in designated utility corridors. 	Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • Avoid ROWs (including communication sites) in all suitable WSR corridors, except in designated utility corridors. (GSENM ROD 2020, KEPA ROD 2020) 	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILD AND SCENIC RIVERS				Not for analysis. For comparison only.	
282.	Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • WSR corridors within WSAs, and ISAs will be managed as VRM Class I 	Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • WSR Wild segment corridors and all corridors within WSAs and ISAs will be managed as VRM Class I. • All other WSR Scenic and Recreation segments will be managed as VRM Class II. 			Management Direction: Manage suitable segments as follows: <ul style="list-style-type: none"> • WSR corridors within WSAs will be managed as VRM Class I (GSENM ROD 2020, KEPA ROD 2020) 	Management Direction: No similar management direction.
283.	Management Direction: The following river segments in GSENM have been determined eligible for inclusion in the National Wild and Scenic Rivers System. The BLM will continue to manage the eligible segments for their free-flowing condition, water quality, identified tentative classification, and preservation of ORVs until a determination of their suitability can be made with the Glen Canyon National Recreation Area. The eligible river segments and classifications are: ⁶ <ul style="list-style-type: none"> • Scorpion Gulch; Wild • Fools Canyon; Wild • Coyote Gulch; Wild 				Management Direction: Approximately 1.51 miles of river segments in GSENM have been determined eligible for inclusion in the National Wild and Scenic Rivers System. The BLM will continue to manage the eligible segments for their free-flowing condition, identified tentative classification, and preservation of ORVs until a determination of their suitability can be made with Glen Canyon National Recreation Area. The eligible river segments, classifications, and miles are: ⁷ <ul style="list-style-type: none"> • Scorpion Gulch; Wild; 0.81 miles • Fools Canyon; Wild; 0.001 miles • Coyote Gulch; Wild; 0.70 miles 	Management Direction: No similar management direction.

⁶ Eligibility determinations were made as part of the 1999 Monument Management Planning effort.

⁷ Eligibility determinations were made as part of the 1999 Monument Management Planning effort.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILDERNESS STUDY AREAS (WSA)				Not for analysis. For comparison only.	
284.	<p>Goal: Manage WSAs and ISAs in a manner that does not impact or impair their suitability for designation as wilderness.</p>				<p>Goal: Manage WSAs and ISAs in a manner that does not impact or impair their suitability for designation as wilderness. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Goal: Existing WSAs in the Monument will be managed under the BLM's Interim Management Policy and Guidelines for Lands Under Wilderness Review (BLM Manual H-8550-1) until legislation takes effect to change their status. The major objective of the Interim Management Policy is to manage lands under wilderness review in a manner that does not impair their suitability for designation as wilderness. In general, the only activities permissible under the Interim Management Policy are temporary uses that create no new surface disturbance nor involve permanent placement of structures. Temporary, nondisturbing activities, as well as activities governed by valid existing rights, may generally continue in WSAs.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILDERNESS STUDY AREAS (WSA)				Not for analysis. For comparison only.	
285.	<p>Allocation: Manage the following WSAs (this includes ISAs):</p> <ul style="list-style-type: none"> • Phipps-Death Hollow • Steep Creek • North Escalante Canyons/The Gulch • Carcass Canyon • Scorpion • Escalante Canyons Tract I • Escalante Canyons Tract 5 • Devils Garden • The Blues • Fiftymile Mountain • Death Ridge • Burning Hills • Mud Spring Canyon • The Cockscomb • Paria/Hackberry • Wahweap 				<p>Allocation: Manage 881,997 acres as WSAs (this includes ISAs) (GSENM ROD 2020, KEPA ROD 2020).</p> <ul style="list-style-type: none"> • Phipps-Death Hollow ISA- 42,731 acres • Steep Creek WSA- 21,896 acres • North Escalante Canyons/The Gulch ISA- 120,204 acres • Carcass Canyon WSA- 47,351 acres • Scorpion WSA- 35,884 acres • Escalante Canyons Tract I ISA- 360 acres • Escalante Canyons Tract 5 ISA- 760 acres • Devils Garden ISA- 638 acres • The Blues WSA- 19,030 acres • Fiftymile Mountain WSA- 148,802 acres • Death Ridge WSA- 63,667 acres • Burning Hills WSA- 61,550 acres • Mud Spring Canyon WSA- 38,075 acres • The Cockscomb WSA- 10,827 acres • Paria/Hackberry and Paria/Hackberry 202 WSA- 135,822 acres • Wahweap WSA- 134,400 acres 	<p>Allocation: The Monument contains 16 WSAs, totaling approximately 881,997 acres, or about 47 percent of the BLM acres in the Monument:</p> <ul style="list-style-type: none"> • Phipps-Death Hollow ISA – 42,731 acres • Steep Creek WSA – 21,896 acres • North Escalante Canyons/The Gulch ISA – 120,204 acres • Carcass Canyon WSA – 47,351 acres • Scorpion WSA – 35,884 acres • Escalante Canyons Tract I ISA – 360 acres • Escalante Canyons Tract 5 ISA – 760 acres • Devils Garden ISA – 638 acres • The Blues WSA – 19,030 acres • Fiftymile Mountain WSA – 148,802 acres • Death Ridge WSA – 63,667 acres • Burning Hills WSA – 61,550 acres • Mud Spring Canyon WSA – 38,075 acres • The Cockscomb WSA – 10,827 acres • Paria/Hackberry and Paria/Hackberry 202 WSA – 135,822 acres • Wahweap WSA – 134,400 acres
286.	<p>Management Direction: Manage WSAs as follows, subject to valid existing rights and grandfathered uses:</p> <ul style="list-style-type: none"> • VRM Class I • ROW exclusion • OHV closed areas 				<p>Management Direction: Manage WSAs as follows, subject to valid existing rights and grandfathered uses (GSENM ROD 2020, KEPA ROD 2020):</p> <ul style="list-style-type: none"> • VRM Class I • ROW exclusion • OHV limited areas 	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	WILDERNESS STUDY AREAS (WSA)				Not for analysis. For comparison only.	
287.	<p>Management Direction: Should any WSA or ISAs, in whole or in part, be released from wilderness consideration, manage such released lands in accordance with the goals, objectives, and management prescriptions established in this RMP, unless otherwise specified by Congress in its releasing legislation. Examine proposals in the released areas on a case-by-case basis but defer all actions that are inconsistent with RMP goals, objectives, and prescriptions until a land use plan amendment is completed.</p>	<p>Management Direction: Should any WSA or ISAs, in whole or in part, be released from wilderness consideration, continue past management of such released lands, unless otherwise specified by Congress in its releasing legislation, in a manner to ensure that GSENM objects are protected. The following will occur:</p> <ul style="list-style-type: none"> • Re-inventories for wilderness characteristics of all released WSAs not designated as wilderness. • Until inventories for wilderness characteristics are completed, and all steps necessary have been completed to establish management of the released areas moving forward, no proposals/actions will occur in the released areas unless consistent with, at a minimum, the protection wilderness characteristics and protection of GSENM objects, or for public health and safety. 			<p>Management Direction: Should any WSA or ISAs, in whole or in part, be released from wilderness consideration, manage such released lands in accordance with the goals, objectives, and management prescriptions established in this RMP, unless otherwise specified by Congress in its releasing legislation. Examine proposals in the released areas on a case-by-case basis but defer all actions that are inconsistent with RMP goals, objectives, and prescriptions until a land use plan amendment is completed. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>
288.	<p>Management Direction: Prohibit off-route parking or vehicle-based camping in WSAs.</p>				<p>Management Direction: Prohibit off-route parking in WSAs. (GSENM ROD 2020, KEPA ROD 2020)</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	PUBLIC HEALTH AND SAFETY				Not for analysis. For comparison only.	
289.	Goal: Reduce hazards to public health and safety.	Goal: Promote the health and safety to visitors in GSENM.			Goal: Reduce hazards to public health and safety. (GSENM ROD 2020, KEPA ROD 2020)	Goal: No similar goal.
290.	Objective: Ensure that human health and safety concerns on public lands remain a major priority.	Objective: Provide for opportunities in GSENM that minimize health and safety hazards.			Objective: Ensure that human health and safety concerns on public lands remain a major priority. (GSENM ROD 2020, KEPA ROD 2020)	Objective: No similar objective.
291.	Management Direction: Minimize or mitigate hazardous or potentially hazardous sites and situations, including hazardous materials, hazardous or solid wastes, abandoned mine sites, abandoned well sites, and other potential hazards on public lands. Minimize the potential for intentional or accidental releases of hazardous materials or wastes and solid wastes onto public lands.	Management Direction: Remediate hazardous or potentially hazardous sites and situations, including hazardous materials, hazardous or solid wastes, abandoned mine sites, abandoned well sites, and other potential hazards.			Management Direction: Minimize or mitigate hazardous or potentially hazardous sites and situations, including hazardous materials, hazardous or solid wastes, abandoned mine sites, abandoned well sites, and other potential hazards on public lands. (GSENM ROD 2020, KEPA ROD 2020) Minimize the potential for intentional or accidental releases of hazardous materials or wastes and solid wastes onto public lands. (GSENM ROD 2020, KEPA ROD 2020)	Management Direction: No similar management direction.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SCIENCE				Not for analysis. For comparison only.	
292.	Goal: Provide opportunities for science and research on GSENM.	Goal: Fulfill the vision of GSENM as a premier outdoor laboratory and a place for understanding our environment, our history, our planet's past, and our place in the universe.			Goal: Provide opportunities for science and research on GSENM. (GSENM ROD 2020)	Goal: Monument management priorities and budgets will focus on a comprehensive understanding of the resources of the Monument while assisting in the development of improved and innovative land management, restoration, and rehabilitation practices. The natural, physical, and social sciences, including the study of history will each play an essential role in science and research activities. Research projects will have a multi-scale and interdisciplinary approach when possible. Recreation and other uses will be managed to complement science and research objectives (2000 MMP).
293.	Objective: No similar objective.	Objective: Ensure best available scientific information is a primary foundation for all management decisions.			Objective: No similar objective.	Objective: No similar objective.
294.	Management Direction: No similar management direction.	Management Direction: Design scientific research projects to avoid impacts on and advance the protection of GSENM objects. Allow scientific research that has potential or actual short-term or temporary adverse effects on resources (including GSENM objects) in order to provide for exceptionally high-value science and/or long-term protection and resilience of resources.			Management Direction: No similar management direction.	Management Direction: No similar management direction.
295.	Management Direction: No similar management direction.	Management Direction: Prioritize inventory of and basic research on GSENM objects in danger of being lost over short timeframes (100 years or less) over those that are more stable in the long term.			Management Direction: No similar management direction.	Management Direction: The first priority for conducting BLM-sponsored research will be to study, collect, or record scientific information that is most at risk of being damaged or lost through disturbance or the passage of time, including oral histories and ethnologies related to the Monument area.
296.	Management Direction: No similar management direction.	Management Direction: Actively promote basic and applied science on GSENM resources and objects and disseminate the findings of such research.			Management Direction: No similar management direction.	Management Direction: Conduct applied research regarding the management of natural systems, including disturbance and recovery strategies.

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SCIENCE				Not for analysis. For comparison only.	
297.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Allow minor deviations for group size and camping stay on science permits. Deviations will conform to the Science Plan, be concurred with through an identification process as part of processing the permit, and be approved by the BLM Authorized Officer.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Researchers will have to comply with the decisions in this Plan. However, some science and research activities may require the use of equipment, surface disturbance, and/or personnel which could exceed the management prescriptions outlined for visitors and other users. Except where specifically prohibited (such as in relict plant areas, wildlife protected activity centers), the BLM will consider exceptions to the Plan prescriptions during the special-use permitting process for extremely high-value research opportunities, especially for those opportunities that may not be available elsewhere. Research projects focused on protecting resources at risk will also be considered for exceptions to zone prescriptions. The GSENM Advisory Committee will be consulted on whether research proposals which require restricted activities warrant the requested exceptions. Evaluation will consider whether the proposed research can be permitted in a manner consistent with the protection of Monument resources, and whether the methods proposed are the minimum necessary to achieve the desired research objective.</p>
298.	<p>Management Direction: No similar management direction.</p>	<p>Management Direction: Maintain a GSENM Science Plan that directs the administration of a science program and is informed by indigenous knowledge.</p>			<p>Management Direction: No similar management direction.</p>	<p>Management Direction: No similar management direction.</p>

Row No.	Alternative A	Alternative B	Alternative C	Alternative D	2020 GSENM and KEPA RMPs	2000 Monument Management Plan
	SCIENCE				Not for analysis. For comparison only.	
299.	<p>Management Direction: Require a science permit application for internal and external research projects on GSENM. The application will be reviewed by an interdisciplinary team and approved or denied by the BLM Authorized Officer. Require appropriate collection permits or licenses.</p>	<p>Management Direction: Require a permit for scientific research projects in GSENM.</p>			<p>Management Direction: Require a science permit application for internal and external research projects on GSENM. The application will be reviewed by an interdisciplinary team and approved or denied by an authorized officer. Require appropriate collection permits or licenses. (GSENM ROD 2020)</p>	<p>Management Direction: All research and related educational activities will require special-use permits.</p>

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2.5 SUMMARY COMPARISON OF ENVIRONMENTAL CONSEQUENCES

2.5.1 Air Resources

Impacts on air quality include fugitive dust generation (for example, from vehicular travel on unpaved roads or from destruction of vegetation and exposure and degradation of soils). Among the alternatives, Alternative A would result in the greatest level of air quality impacts from fugitive dust and other criteria air pollutant emissions (such as increased VOCs and carbon monoxide from OHVs and smoke from uncontrolled wildfires), while Alternative D would result in the smallest concentration of pollutants. However, differences across the alternatives would not be significant; the impacts would primarily come from increasing recreation and travel, which would be similar under all alternatives. Within areas closed to OHV travel, emissions would decrease locally; however, motorists could move and concentrate in areas available to OHV travel, resulting in localized degradation of air quality.

Methane emission from livestock grazing is a primary source of total GHGs from activities in GSENM. Alternative A, with the highest number of allowed AUMs would result in the most methane emissions and impacts on climate change, while Alternative D would have the least impacts. Although prescribed fire and active vegetation management under Alternatives B and C would result in the largest GHG emissions from equipment use, they would not be substantial compared with impacts from grazing. With proper grazing techniques, some of the emitted carbon can be sequestered and stored in soil and vegetation. Active vegetation management under Alternatives B and C would improve vegetation health and diversity, which would increase the carbon sequestration and storage potential in GSENM. Active vegetation management under Alternatives B and C would also improve landscape resiliency to wildfires more quickly compared with Alternatives A or D, which would also offset some of the climate change impacts from other actions.

2.5.2 Soil Resources

Land management actions would directly and indirectly impact soil resources within the decision area, including activities associated with ROW development and special land use designations, recreation management, management of livestock grazing, and vegetation and forest management. The decision area contains several soils with special characteristics and biological soil crusts that may limit the potential of these soils to be suitable or compatible with certain management activities; these soils would be directly impacted by ground-disturbing activities.

All four alternatives would, at a minimum, seek to manage uses to prevent damage to and degradation of soil resources and to ensure that appropriate soil health parameters would be maintained or improved. Additionally, all four alternatives would aim to facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts. Under Alternative A, more acreage would remain open for ROW authorizations, OHV use, recreation, and livestock grazing compared with the other three alternatives, resulting in potentially more ground disturbance that would impact soils and degrade soil health parameters and biological soil crusts. Therefore, more impacts on sensitive soils, biological soil crusts, and soil health and function would be expected under Alternative A. Alternatives B and C would allow a middle ground in terms of acres that would be open to ground-disturbing activities, while Alternative D would generally be the most restrictive alternative.

2.5.3 Vegetation

Alternatives A and B would likely have greater success in moving vegetation conditions toward desired conditions, and increase resiliency of treated areas more quickly and in more areas than Alternatives C

or D. This is because Alternatives A and B would increase the amount of proactive vegetation management and use of a wider array of vegetation management methods. This would also benefit special status plant species in the long term by helping to reduce threats such as competition with invasive species and potential for wildlife. It would improve conditions for pollinators, thereby increasing pollination opportunities for special status plants. Prioritizing natural processes under Alternative D and in the primitive management areas under Alternative C could restrict active management of vegetation. Alternatives B and C would increase the options for post-fire stabilization and rehabilitation, including options for native and nonnative seedings and complementary treatments to enhance seeding success. This would help to maintain and improve vegetation conditions in burned areas to a greater degree than if these options were not allowed.

Alternatives A and B would place the most emphasis on increasing recreational opportunities. This could increase the amount of noxious and invasive species and degrade vegetation and outcompete special status plant species located in recreation areas and along designated routes. It also could increase the potential for human-caused ignitions in these areas. This could result in an increased risk of uncharacteristic fire and decreased vegetation resiliency, compared with management under Alternative D, which would manage fewer of these recreation areas. Of the alternatives, Alternative D would generally include the most allocations to protect lands with wilderness characteristics and other sensitive areas, leading to less impacts on vegetation and special status species from discretionary and compatible uses.

Alternative A would have the most AUMs and acres available to grazing compared with Alternatives B, C, and D. This could result in an increased risk of impacts on vegetation conditions and resiliency due to impacts from improper grazing. Alternative D would have the least number of AUMs and acres available for grazing across all alternatives, which would significantly reduce impacts on vegetation and special status species from grazing.

Regardless of alternative, the planning area will experience increased risk of uncharacteristically large and severe fire due to warmer temperatures, altered precipitation patterns, longer fire seasons, and more extreme fire weather. Climate change effects will combine with and exacerbate some of the effects of the alternatives, especially those that would increase fuels from invasive plants and increase the risk of human-caused fire. These factors would be expected to result in more fire ignitions, more acres burned, and less resilient vegetation conditions.

2.5.4 Water Resources

Under Alternative A, water resources would be managed to protect and maintain water and natural flows, including water flowing into GSENM from adjacent lands. Alternative A is less protective against impacts than Alternatives C and D because it allows new water developments with no restriction, where Alternative C would only allow new water developments in the front country and passage area and Alternative D would prohibit new water developments unless beneficial for natural resource maintenance, restoration, or protection of GSENM objects.

Under Alternative B, resources would be managed to maximize the potential for discretionary actions that are compatible with the protection of GSENM objects. Alternative B provides additional goals of management related to maximizing goals and objectives of GSENM, rather than just maintaining the current hydrology/water quality.

Alternative A is less protective against impacts than Alternative B because under Alternative A, maintenance of existing water developments is to improve livestock and wildlife distribution, while maintenance of water developments under Alternative B would be done to protect, restore, and/or increase the resiliency of GSENM objects.

Alternatives C and D would be the most protective of hydrology within GSENM. Under Alternative C, resources would use area management to carefully allow for discretionary uses in appropriate settings. Alternative C would be more protective of water supply than Alternative B. In the front country area, Alternative C would allow development and maintenance of water sources to support recreation and visitor-related uses. In the passage, outback, and primitive areas, it is the same as Alternative D in that it would prohibit new recreation related water developments, unless necessary for natural resources maintenance, restoration, or protection of GSENM objects. Additionally, under Alternative C, in the primitive area, new water developments would be prohibited unless a primary purpose of the water development is to protect or restore the resiliency of GSENM objects; and it would maintain water developments for livestock or wildlife or modify them if it protects, restores, and/or increases resiliency of GSENM objects. These management directions would be the same as Alternative D; however, in the front country, outback, and passage areas, these water developments would be allowed if they contribute to the protection, restoration, and/or increase the resiliency of GSENM objects, the same as Alternative B.

Under all alternatives, measures are required to stabilize soils and minimize surface water runoff for actions on slopes greater than 10 percent. Surface-disturbing activities result in disruption or damage of biological soil crusts and create opportunities for the establishment and spread of noxious weeds that provide less vegetative cover than native species (Scott et al. 2017). Impacts on water resources that are associated with soil erosion water development include decreased water quality in groundwater and surface water and the potential for contamination to groundwater. Management under Alternatives C and D are more protective against impacts on water resources than Alternative A because Alternatives C and D prohibit soil disturbing actions on areas where soils are mapped and considered as fragile, which can affect water resources through increased erosion and sedimentation, alterations to geomorphology, natural flood control, and pollutant loading.

2.5.5 Noxious Weeds and Invasive, Nonnative Plants

Alternatives A and B, in comparison with Alternatives C and D, would likely have greater success in moving vegetation conditions toward desired conditions, which includes a reduction or eradication of noxious and invasive, nonnative species. Alternative A and B would increase resiliency of treated areas more quickly and in more areas through proactive vegetation management and using a wider array of vegetation treatment methods than Alternatives C or D. Prioritizing natural processes under Alternative D and in the primitive management areas under Alternative C could restrict active management of vegetation.

Alternatives B and C would also increase the options for post-fire stabilization and rehabilitation, including options for native and nonnative seedings and complementary treatments to enhance seeding success. This would help to reduce the establishment and spread of noxious and nonnative, invasive species in burned areas to a greater degree than if these options were not allowed.

Alternatives A and B would place the most emphasis on increasing recreational opportunities, including for motorized and nonmotorized recreation. This could increase the amount of noxious and nonnative, invasive species and fine fuels in recreation areas and along designated routes. This could result in an increased risk of uncharacteristic fire and decreased vegetation resiliency, compared with management under Alternative D, which would manage fewer of these recreation areas. Alternative A also allows for open OHV travel, which would increase vectors of weed spread across GSENM. Of all the alternatives, Alternative D would generally include the most allocations to protect lands with wilderness characteristics and other sensitive areas, leading to less impacts from compatible uses.

Alternative A would have the most AUMs and acres available to grazing, compared with Alternatives B, C, and D. This would result in increased surface disturbance and vectors for noxious and invasive species spread. Alternative D would have the least number of AUMs and acres available for grazing across all alternatives, which would significantly reduce the influence of grazing on weed spread in these areas.

Regardless of alternative, the planning area will experience increased risk of uncharacteristically large and severe fire due to warmer temperatures, altered precipitation patterns, longer fire seasons, and more extreme fire weather. Climate change effects will combine with and exacerbate some of the effects of the alternatives, especially those that would increase invasive plants and increase the risk of native communities converting to invasive-dominated communities. These factors would be expected to result in increased fuels from invasive plants, more fire ignitions, more acres burned, and less resilient vegetation conditions.

2.5.6 Cultural Resources

Under Alternative A, plan elements specific to cultural resources would remain from the 2020 Approved RMPs. These plan elements include direction for the identification, preservation, and protection of cultural resources; the reduction of threats and conflicts from other resources; restoration and stabilization of cultural resources; opportunities for traditional use; and the development of cultural resource management plans. Under each alternative, plan elements specific to cultural resources would be similar in intent to those of Alternative A. However, they would move the plan elements—reducing the threats and conflicts, restoring and stabilizing important and at-risk resources, and providing opportunities for traditional uses—from goals and objectives to management directions. This would make them more action oriented and add detail, such as specific direction to avoid, reduce, or remove imminent and long-term threats and to identify, monitor, and stabilize at-risk cultural resources.

Alternatives B, C, and D include a plan element to employ the cultural resources predictive model to manage authorizations in high-probability areas; Alternative A does not include this plan element. The model statistically evaluated the relationships between known site locations and environmental variables to predict the likely occurrence of cultural resources across GSENM. Under Alternative A, the highest number of known cultural resources, and the most acres with a high probability for cultural resources, could be impacted from management decisions. Project-specific Section 106 compliance would seek to avoid, minimize, or mitigate any adverse effects on cultural resources; however, the risk for unintentional impacts would be greatest under Alternative A.

Alternatives B, C, and D include management decisions related to a variety of resources that reduce the potential for impacts on cultural resources, compared with Alternative A. Alternative D would offer the greatest reduction for potential impacts on known cultural sites and in areas with a high probability for

cultural resources. While there would be fewer acres of ACECs and RNAs (ACECs) to potentially protect unknown resources under Alternative D, compared with Alternatives B and C, this is counteracted by the greater acreages of provisions limiting ground-disturbing activities under Alternative D, such as VRM classifications, lands with wilderness characteristics management, grazing unavailability, ROW exclusion, and OHV closures. Alternative A includes the greatest number of allotments that are available for grazing and, therefore, the highest risk to cultural resources. Alternatives B, C, and D offer an increasing amount of reduction, respectively, of potential adverse impacts on cultural resources within allotments compared with Alternative A.

2.5.7 Tribal Interests

Under Alternative A, current conditions and trends influencing impacts on tribal interests, such as water resources, plant communities, and cultural landscapes, would continue as they are now. Many aspects of management related to a diversity of resources would influence impacts on tribal interests under the alternatives considered. Alternative A would have the largest impacts on tribal interests from cultural resource management, livestock grazing, travel management, OHV use, management of lands with wilderness characteristics, designation of RMAs, and ROW development. Acreages of land management allocations and management directions that would influence these impacts change with each alternative, with the allocations under Alternative D generally being the most protective of tribal interests. Although Alternative D would offer the most protection to tribal interests through restriction of discretionary uses.

Alternatives B, C, and D contain additional identical management direction related to tribal co-stewardship. Alternative A provides general guidance for tribal co-stewardship; however, under Alternatives B, C, and D, this guidance would be more explicit in directing how to protect tribal interests and foster tribal involvement in the land use planning process.

2.5.8 Paleontological and Geological Resources

Under Alternative A, paleontological resources would continue to be managed in accordance with the 2020 GSENM and KEPA RMPs, except where those management decisions do not align with the Proclamation. While specific goals, objectives, and management direction varies slightly between Alternative A and Alternatives B, C, and D, many of the key elements are the same. For Alternatives B, C, and D, management includes slightly more emphasis on implementation of plans and management strategies in addition to development of protocols.

Management for other resources, including vegetation management, maximum soundscape dBAs, and group size limits, could have an impact on paleontological resources. For example, more invasive vegetation management options authorized under Alternative A, or possibly allowed under Alternatives A and B, would result in more ground disturbance, and if in an area with paleontological resources (such as PFYC Class 4 or 5) could result in increased potential for impacts. Whereas limitations on maximum dBA in specific or defined locations under Alternatives B, C, and D could limit the types of paleontological resource excavation equipment, including handheld devices (such as jack hammers and rock saws) that could be used (unless exceptions are allowed). Group size limits could limit the maximum number of field crew members in specific locations; this is most restrictive under Alternative D. Additionally, for all alternatives, soil and VRM may require additional approvals prior to paleontological excavation (such as on slopes greater than 30 percent) or after an excavation is initiated but not completed within a specific period (such as 2 or 3 years).

Based on potential fossil yield classification Classes 4 and 5 acres, Alternative A has the greatest potential for impacts to paleontological resources from ROW authorization, RMA, OHV travel, and grazing management decisions. Under Alternative A, the smallest acreage would be protected through the management of special designation areas (such as RNAs [ACECs] and lands with wilderness characteristics).

Special designations and restrictions on surface disturbance reduce the potential for impacts on paleontological resources as they would restrict the frequency and extent of surface-disturbing activities and recreation uses that could adversely affect paleontological resources. Thus, compared with Alternative A, management under Alternatives B, C, and D would reduce potential impacts on paleontological resources as they all include an increase in area managed as limited or closed for specific ground-disturbing activities.

Under Alternative A, there are no defined goals, objectives, or management directions for geological resources (or unique geological features). In contrast, Alternatives B, C, and D provide geological resource management directions for identification of geological sites appropriate for public access and proactively maintaining an annual inventory, monitoring of, and, where appropriate, collecting and curating geological resources, with a focus on areas identified in Proclamation 10286.

2.5.9 Fish and Wildlife

Many goals, objectives, management directions, and allocations for wildlife and fish would remain the same or be similar under all alternatives. These directives provide protection for wildlife and habitats while allowing for other discretionary uses. Management direction for all alternatives would include limiting discretionary uses to protect and recover special status species' (BLM Utah sensitive species and federally listed threatened, endangered, proposed, or candidate plant, animal, or fish species) habitats and populations.

Alternative A would allow for maximum discretionary uses and emphasize management flexibility. Under Alternative A, current trends pertaining to wildlife and habitat, including special status species, would likely continue. Alternative B would emphasize flexibility in planning-level direction to maximize the potential for an array of discretionary actions that would be compatible with the protection of GSENM objects. The allowance of discretionary actions under Alternative B would likely result in impacts on wildlife, including special status species, and wildlife habitat that would be similar to the impacts under Alternative A.

Alternative C would emphasize the protection of intact and resilient landscapes using an area management approach to allow for discretionary uses in appropriate settings. Under Alternative C, more protection in the outback and primitive areas would likely reduce impacts on wildlife in those areas, compared with Alternative A. The front country and passage areas would allow for more discretionary uses and therefore would likely have similar impacts on wildlife and habitat as Alternative A. However, because proactive management would not be prioritized, habitats in the outback and primitive areas could restrict the use of tools that would be beneficial for habitat improvements.

Alternative D would maximize natural processes by limiting discretionary uses. This alternative would also constrain management actions to emphasize natural conditions, such as passive vegetation management. Alternative D would protect more wildlife and habitat through land use allocations and therefore reduce

impacts on wildlife and habitat as compared with Alternative A. However, by emphasizing natural processes as opposed to active management, this alternative would also limit some management actions or extend the time it would take to achieve desirable conditions that could improve wildlife habitat.

2.5.10 Visual Resources

Alternative A would continue to manage large portions of GSENM under VRM Class I and II objectives where management activities would preserve or retain the natural landscape character and not attract the attention of casual viewers. Under Alternative A, the BLM would continue to manage portions of landscapes inventoried as having high scenic quality under VRM Class III and IV objectives where management activities could moderately alter (VRM Class III) or dominate (VRM Class IV) the characteristic landscape.

Alternatives B, C, and D would not manage any GSENM lands with VRM Class IV objectives. They, therefore, would not allow for major modification of the characteristic landscape. In Alternative B, the portion of The Cockscomb within the congressionally designated utility corridor along U.S. Highway 89 would be managed with VRM Class III objectives, though it inventoried as a high scenic quality landscape; this would allow future utility projects to moderately alter the area's landscape character. Under Alternative C, no landscapes inventoried as having high scenic quality would be managed for VRM Class III objectives. Alternative D would only assign VRM Class I or II objectives to GSENM lands, resulting in all landscapes retaining their landscape character.

Under Alternatives A and B, between approximately 47 percent and 51 percent of GSENM lands would be managed with VRM Class I objectives where only negligible and natural process changes to landscape would be allowed; under Alternative C, the acres would increase to 57 percent, and under Alternative D, they would increase to 77 percent. Under Alternatives A and D, approximately 25 percent of lands would be managed as VRM Class II objectives, which allow only minor changes in the landscape character such that the attention of the casual observer is not attracted. Under Alternative B and C, approximately 30 percent of GSENM would be managed for VRM Class II objectives. Alternatives A and B would allow for the most acres to be managed as VRM Class III (19 percent) where projects could modify the landscape character such that changes could attract the attention of the casual observer, and Alternative D would not allow any lands to be managed to these objectives. Alternative C would allow for 8 percent of GSENM to be managed with VRM Class III objectives. Only Alternative A allows for any lands within GSENM (12 percent) to be managed for objectives that allow major modification of the landscape character (VRM Class IV).

VRM Class I and II objectives are the more protective of scenic values. Comparing alternatives, Alternative D is the most protective because it manages the entire GSENM under these two VRM classes. The level of protection lessens across alternatives from Alternative C to B to A, with Alternative A being the least protective of scenic values with 20 percent of the GSENM managed as VRM Class III and 12 percent as VRM Class IV.

2.5.11 Dark Night Skies

Under Alternative A, existing trends associated with dark night skies would continue. Under Alternatives B, C, and D, the BLM would seek International Dark Sky Place status for GSENM. Because the BLM does not have the ability to restrict or prohibit lighting outside GSENM, impacts on dark night skies from adjacent communities and more distant cities would be similar under all alternatives. Alternatives C and

D would be the most protective of dark night skies, followed by Alternative B, with Alternative A resulting in the greatest potential impacts on dark night skies.

2.5.12 Natural Soundscapes

Under Alternative A, the application of BMPs outlined in the 2020 GSENM RMPs would continue with no specific areas identified where noise-producing facilities would be prohibited, no limitation on where drone takeoffs and landing could occur, and no further limitations on where OHV use could occur. These would result in continued impacts on soundscapes within GSENM.

Alternatives B, C, and D would identify specific areas where no noise-generating facilities could occur. They also would include additional management prescriptions to limit noise in other areas, limits on where drones can take off and land, identification of appropriate landing areas and landing strips for aircraft, and the expansion of areas closed to OHV use. These would result in further protection of soundscapes compared with Alternative A. Additionally, Alternatives B, C, and D would establish quiet hours at campgrounds, designated camping locations, and other locations, including potential intermittent noise from generators associated with recreational use. These quiet hours would further protect soundscapes where concentrated recreation use occurs. Noise-producing facilities would be most limited under Alternatives C and D because these alternatives identify larger portions of GSENM as either closed to OHV use or where noise-generating facilities would be specifically prohibited.

Under Alternative A, increased noise levels could occur near all of the GSENM noise-monitoring locations, whereas Alternatives B, C, and D would further protect soundscapes adjacent to these monitoring locations. To restore natural soundscapes, under Alternatives B, C, and D, existing facilities that generate sounds would be retrofitted to reduce sound generated below the identified thresholds under each alternative, to the extent possible.

2.5.13 Fire and Fuels Management

Alternatives B and C would likely move the vegetation condition and fuel loading toward desired conditions, and increase resiliency of treated areas more quickly and in more areas than Alternatives A or D. Alternatives B and C would increase the amount of proactive vegetation management to reduce hazardous fuels, and would allow a wider array of vegetation management methods than under Alternative A. Alternative D, using only natural processes would not be as effective in vegetation communities that are most departed from historical conditions, due to the amount of hazardous fuel loading in these areas and the increased potential for catastrophic wildfire. Alternatives B and C would also increase the options for post-fire stabilization and rehabilitation relative to Alternatives A and D, including options for native and nonnative seedings and complementary treatments to enhance seeding success. This would help maintain the vegetation condition and fire regime in burned areas to a greater degree than if these options were not allowed.

Alternatives A, B, and C would place the most emphasis on increasing recreational opportunities. This could increase the amount of fine fuels in recreation areas and along designated routes and increase the potential for human-caused ignitions in these areas. This could result in more fires and more acres burned, compared with management under Alternative D, which would manage fewer of these areas. When fires ignite in GSENM, allocations to protect lands with wilderness characteristics and other sensitive areas, could make fire response more complex or difficult; this is because some response methods could be

restricted to protect the wilderness character or other sensitive resources. Of the alternatives, Alternative D would generally have the most of these allocations.

Regardless of alternative, the planning area will experience an increased risk of uncharacteristically large and severe fire due to warmer temperatures, altered precipitation patterns, longer fire seasons, and more extreme fire weather. Climate change effects will combine with and exacerbate some of the effects of the alternatives, especially those that would increase fuels from invasive plants and increase the risk of human-caused fire from more recreational use. These factors would be expected to result in more fire ignitions, more acres burned, and movement away from historical vegetation conditions and fire regimes.

2.5.14 Lands with Wilderness Characteristics

Alternative A would continue to manage all lands with wilderness characteristics to allow for other uses. By comparison, Alternative B would manage 72,000 acres for the protection of wilderness characteristics, while Alternative C would manage 190,100 acres of lands with wilderness characteristics for the protection of those characteristics. Under both Alternatives B and C, compatible uses may be allowed on other lands with wilderness characteristics so long as those activities are consistent with the protection of GSENM objects. Alternative D would manage all lands with wilderness characteristics in GSENM (559,600 acres) for the protection of those characteristics. Under Alternatives A, B, and C, managing lands with wilderness characteristics to allow for other multiple uses or for other compatible uses could increase the impacts on the size, apparent naturalness, outstanding opportunities for solitude or primitive, unconfined recreation, and supplemental values.

2.5.15 Forestry and Woodland Products

Alternative A is the only alternative under which areas (984,500 acres) would be open to commercial harvest of woodland products. Alternatives B, C, and D would not allow for commercial harvest of woodland products. Noncommercial harvest of woodland products would be allowed on 984,500 acres under Alternative A, 906,300 acres under Alternative B, 88,000 under Alternative C, and prohibited (with some exceptions) under Alternative D.

2.5.16 Livestock Grazing

Alternative A allows for the most available acres (2,134,800) for livestock grazing and the most AUMs for permitted use. Additionally, Alternative A would activate all inactive AUMs within suspended pastures or allotments, increasing the overall availability of forage over the long term, as rangeland conditions allow. Compared with Alternative A, Alternatives B and C would reduce the acres available for livestock grazing by 97,500 acres (5 percent) and 207,800 acres (10 percent), respectively, while Alternative D would reduce the available acres by 46 percent (984,800 acres). Vegetation management under Alternative B would likely have the greatest positive impact on rangeland health across the planning area, as it would emphasize widespread restoration, including seedings with native and nonnative species. Alternative C would manage the most acres of SRMAs, having the highest potential for recreation-livestock conflicts in these areas.

2.5.17 Recreation

Under all alternatives, management for recreation would have long-term beneficial effects on GSENM's associated objects. Of all alternatives, Alternative C would include the greatest designation of SRMAs; therefore, it would provide the most prescriptive recreational management.

Alternative A includes the greatest portion of the decision areas as ERMA, which could provide greater management flexibility to adapt to changes in recreational use and facility needs compared with the other alternatives. Alternative B would result in similar impacts on recreation from designation of RMAs as under Alternative A, with slightly different recreation decisions associated with the different SRMA, ERMA, and RMZ designations. Alternative D would designate the fewest acres within RMAs of all alternatives. It would limit the BLM's ability to manage for recreational opportunities; this would ultimately limit the beneficial outcomes of recreation compared with the other alternatives.

Alternative A includes the most acreage available for recreational target shooting, which would continue to result in the potential displacement of recreationists seeking other recreation opportunities, which could result in conflicts with other recreational users in GSENM. Alternative B would limit access for recreational target shooting, compared with Alternative A, because it manages more acreage as closed to recreational target shooting. Alternative C would limit access the shooting sports community to a larger extent than Alternatives A and B because it would manage more acreage as closed to recreational target shooting. Under Alternative D, the BLM would prohibit recreational target shooting across the entire GSENM. This would reduce the potential for conflicts with other recreational users compared with all other alternatives, but it also would eliminate access for all recreational target shooting. This could lead to instances of unauthorized target shooting in GSENM.

Alternative A would be the only alternative that would allow for open cross-country OHV travel. This would provide the greatest access to OHV opportunities, could reduce unauthorized off-trail travel in other areas, and reduce conflicts between motorized recreations, compared with Alternatives B, C, and D. This would continue to result in damage to resources such as native vegetation that could be considered inconsistent with the protection of GSENM's objects. Alternative B would eliminate access for cross-country OHV recreation across GSENM. This could result in unauthorized cross-country OHV travel occurring in certain areas and reduce access for motorized users. Motorized users would likely experience greater conflicts with nonmotorized recreationists on motorized routes in OHV limited areas, as this mileage would be substantially less in Alternative B than in Alternative A. Alternative B would also likely decrease the ability of all recreationists to access nonmotorized trails in certain areas due to the greater area managed as closed to OHV use. Alternative C would result in similar impacts on travel resulting from OHV area designations as under Alternative B, but to a greater extent due to the greater area managed as closed to OHV use. Under Alternative D, the BLM would manage the most acreage as closed to OHV travel of all the alternatives. This would limit resource damage from cross-country OHV travel, decrease impacts on natural settings and primitive recreational experiences, and limit access for authorized all-terrain vehicle and utility-task vehicle recreation. Reduced motorized access could limit accessibility and nonmotorized opportunities in remote areas.

Pedestrian use would be allowed throughout GSENM under all alternatives. Under all alternatives, the establishment of additional recreational infrastructure would enhance recreational opportunities. Alternative A would not specifically address recreational facilities, but there would be few restrictions outside WSAs where development could occur. Alternatives B, C, and D would allow for recreational facilities to provide for future recreational needs, with the most restrictions on the location of facilities under Alternative D. Land use allocations would be the most limited under Alternative D and would curtail discretionary uses, including recreation and activities under SRPs.

2.5.18 Travel Management

Potential effects on travel management would occur to varying degrees across alternatives. Route designations are implementation-level decisions that will be analyzed and approved in accordance with the BLM's travel and transportation regulations at 43 CFR Part 8340 separately through the travel management planning process. This process evaluates and designates routes to provide a high-quality travel network for a wide variety of uses. Examples of beneficial impacts of designating routes through a travel management plan include improved access, experience, and connectivity; the promotion of safety for all users; minimization of conflict among various uses of BLM-managed lands; and reduction in route redundancy, resource degradation, and habitat fragmentation in the planning area. Travel management plans may also provide an opportunity for coordinating transportation planning with Kane and Garfield Counties or adjacent communities. Such coordination could reduce access issues and management conflicts, improve the safety and convenience of the traveling public, and provide a more sustainable use of resources.

Alternative A is the only alternative that allows for any open cross-country OHV travel, specifically in the Little Desert RMZ. This would provide beneficial recreational experiences for some users and could avoid instances of cross-country OHV travel in closed areas or areas limited to designated routes. Alternative A would yield the greatest benefits to travel, transportation, and access because it would manage the fewest acres of OHV closed areas of the alternatives. Management direction for landings and takeoffs of motorized aircraft in GSENM is not described in the 2020 Approved RMPs. This would yield the greatest benefits to access for motorized aircraft use because it does not place any restrictions on motorized aircraft use. However, this could limit the ability of the agencies to protect GSENM objects compared with Alternatives B, C, and D.

The BLM would manage the most acreage as closed to OHV use under Alternative D, limiting the potential for resource damage from OHV travel. Management under Alternative D would be most likely to adversely affect transportation and access for OHVs due to the scale of OHV closures.

Under Alternatives B, C, and D, routes could be maintained and improved to meet public health and safety needs. Appropriate landing areas and landing strips for aircraft would be considered to varying degrees under Alternatives B, C, and D, which could allow for increased aircraft access, compared with Alternative A.

2.5.19 Lands and Realty

Under all alternatives, any pending ROW and land use authorizations applications or renewals are expected to be resolved. The 137 active ROWs and land use authorizations on BLM-managed land would continue to be managed under the direction of each alternative. The BLM would also likely increase land acquisitions in GSENM. This is due to an increase in funding and staffing to the BLM land acquisition program, as well as a rise in willing seller interest.

Under Alternative A, all lands outside WSAs would be either avoidance areas or open for new ROWs, permits, and leases. This would likely increase the number of developments, such as communication sites or utility corridors, because ROWs could be approved so long as they consistent with the protection of GSENM objects. Under Alternative B, there would be more land excluded from ROWs, permits, and leases. Under Alternatives B and C, the BLM could allow renewal and upgrade of existing facilities authorized under a ROW/land use authorization within the decision area. t

Under Alternative C, there would be less land managed as ROW open and avoidance areas, and the BLM would continue to manage land designated as ROW corridors in the planning area for renewals and upgrades; however, new ROWs could be authorized outside of the preexisting designated utility corridors in ROW avoidance areas. Under Alternative D, new ROWs would be authorized in avoidance areas and within the preexisting Highway 89 utility corridor; however, most lands would be managed as ROW exclusion areas.

2.5.20 Special Designations for Conservation and Protection

Areas of Critical Environmental Concern, Research Natural Areas, and Other Special Management Designations

Through designation of multiple new ACECs and RNAs (ACECs), Alternatives B and C would include the most protections of identified values for ACECs, RNAs (ACECs), and other special management designations. Management actions and impacts would vary by designated unit and include closure to OHV uses, prohibiting recreational target shooting, ROW exclusion, and making the areas unavailable to livestock grazing; however, all would align with the protection and management of identified values and GSENM objects. While management actions remain the same across Alternatives B and C, Alternative B would include the most protections for the greatest area, as multiple new ACECs would be designated, increasing the acreage protected. Alternative D would not see designation of new ACECs or RNAs (ACECs); however, through discretionary actions of other resources, the identified values of the proposed ACECs and RNAs (ACECs) would continue to be protected in a manner similar to designation of the areas.

Alternative A would include the least amount of protections of identified values for ACECs, RNAs (ACECs), and other special management designations. This is because, unlike Alternatives B and C, there would be no additional designations. However, management of GSENM objects would provide sufficient management to protect the identified values.

National Trails

The OSNHT Corridor Inventory Project is currently ongoing, and information from that report will be included for impacts analysis as available.

Scenic Routes

Alternative D would provide the highest level of protection of the viewsheds seen from designated scenic byways; this is because the route corridor would extend 5 miles from the route's centerline. The entire corridor would be classified as VRM Class II, which would allow for management activities to be seen but not attract the attention of the casual observer, and any changes would repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. Alternatives B and C would include the same VRM Class II designation, but the designation would only apply to the viewshed as seen from the designated routes within the foreground and middleground zones. This would exclude some areas in the outback area that may be covered by the Alternative D 5-mile corridor. Surface-disturbing impacts could occur in the outback area of the viewshed. Alternative A would continue to manage designated scenic routes to protect the values for which they were established. There would be no management of the viewshed as seen from the designated scenic routes, and impacts within the viewshed from surface development or disturbance would continue.

Wild and Scenic Rivers

Alternative D would provide the greatest level of protection for suitable WSRs, their free-flowing condition, water quality, identified ORVs, and tentative classifications. The BLM would manage all suitable segments and their corridors as ROW exclusion, except in a designated utility corridor. Alternative C would provide the next-highest level of protection by managing all suitable segments in the outback and primitive areas as ROW exclusions. The BLM would manage all other suitable segments as ROW avoidance, except in a designated utility corridor. Alternative B would provide the second-lowest level of protection with only the suitable segments with wild classification corridors managed as ROW exclusion, except in a designated utility corridor. All suitable segments within WSAs, ISAs, and protected lands with wilderness characteristics would be managed as VRM Class I. All other segments would be managed as VRM Class II. Alternative A would provide the lowest level of protection with all suitable segments, regardless of classification, managed as ROW avoidance, except in designated utility corridors and VRM Class I for only those suitable segments that fall within WSAs.

Wilderness Study Areas

Alternatives B, C, and D would provide the highest level of protection to WSAs; this is because they would require re-inventorying WSA units for wilderness characteristics upon their release. No new proposals or actions would occur within the WSA units until the BLM completes the wilderness characteristics inventory. Proposals and actions would have to be consistent with the protection of wilderness characteristics, GSENM objects, or implemented for public health and safety. In comparison, Alternative A would not require re-inventory of wilderness characteristics and would only release lands on a case-by-case basis, as directed by Congress. Across all alternatives, WSAs would continue to be managed as VRM Class I and ROW exclusion, and closed to OHV use.

2.5.21 Social and Economic Values

Under all alternatives, GSENM would continue to stimulate the local and regional economy through increased jobs, wages, economic output, nonmarket values, and ecosystem services from its uses, such as recreational opportunities and grazing and ranching allotments.

Alternative A would likely provide more economic value from grazing through more jobs, labor income, and economic output than Alternatives B, C, and D, due to the larger number of actual AUMs. Alternative B would likely provide more economic value from grazing than Alternatives C and D, and Alternative C would likely provide more economic value from grazing than Alternative D. Alternatives A, B, and C would likely each provide the same amount of economic value from recreation through jobs, income, and economic output. Alternative D could provide less economic value from recreation than Alternatives A, B, and C, if the BLM management decisions lead to a reduction in visitors due to the increase in acres closed to OHV travel, compared with Alternative A, and the potential for more limited access to products and resources. However, there could be an increase in visitors who are looking to recreate in more remote areas.

Impacts on nonmarket values and ecosystem services would be more difficult to quantify than economic values. Under Alternative D, the BLM would protect the most lands with wilderness characteristics and would place the most restrictions on other uses that would not contribute to the protection of the lands, compared with the other alternatives. This would mean the BLM management decisions under Alternative D would most likely provide more nonmarket value associated with open spaces (such as quality-of-life values), but less nonmarket values associated with recreation and grazing (such as mental and physical

health and sense of place) than the other alternatives. Under Alternative A, there would continue to be no lands protected for their wilderness characteristics, which would mean that the BLM management decisions, under Alternative A, would likely provide fewer nonmarket values associated with open spaces, but might provide more nonmarket values associated with recreation and grazing than Alternative D.

2.5.22 Environmental Justice

Under Alternatives B, C, and D, the BLM could maintain and improve routes to meet public health and safety needs. Under Alternatives B, C, and D, public safety concerns could be reduced more than under Alternative A, which limits improvements to the routes listed in the 2000 MMP (BLM 2000, TRAN-7) .

Under all alternatives, the BLM's management decisions could impact environmental justice communities who rely on wood harvesting for heating sources or other uses. Under Alternative D, BLM management decisions would limit noncommercial and commercial timber harvesting, which would be the most restrictive of the alternatives. This could disproportionately impact environmental justice communities by restricting access to products; however, reducing use of wood for heating sources could improve air quality for the surrounding community, including environmental justice populations. These impacts would be site specific and would depend on the location and concentration of the wood burning. Under all alternatives, the BLM would continue to coordinate and consult with tribes with ties to GSENM. Also, the BLM would implement mitigation measures that would reduce impacts on tribal communities, such as impacts on timber and wood cutting resources, sustenance resources, and cultural and spiritual resources.

Under all alternatives, the BLM's management decisions would continue to support environmental justice communities through employment, public services, economic output, and nonmarket benefits and ecosystem services. Under Alternative D, there could be less economic contributions from recreation than the other alternatives, if the BLM management decisions lead to a reduction in visitors due to more restrictions on land use and access to products and resources. On the other hand, there could be an increase in visitors who are looking for solitude. These impacts on the economy could affect environmental justice populations; however, the magnitude of this impact would depend on the overall change in visitation numbers. Additionally, the jobs associated with recreation and tourism are often short-term or seasonal positions, which might have limited impact on overall income for local households. If there are fewer overall visitors under Alternative D, there could be a reduction in negative impacts on cultural resources, which would likely impact environmental justice populations. Under Alternatives B, C, and D, there could be an increase in nonmarket benefits associated with more protected lands, compared with Alternative A, which could be especially impactful to minority populations and Tribal Nations who use GSENM for spiritual and traditional uses.

2.6 REFERENCES

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Chapter 3. Affected Environment and Environmental Consequences

This chapter describes the affected environment and the environmental consequences for the resources likely to be affected by alternatives being evaluated in this Draft RMP/EIS. In 2022, the BLM released the AMS, which describes the baseline conditions in the decision area. This chapter incorporates the AMS by reference and includes new data or information obtained since the AMS was finalized.

The discussion of potential impacts under each resource provides the scientific and analytic basis for evaluating the potential impacts of each alternative described in **Chapter 2**. Due to the programmatic nature of the RMP alternatives, the analysis contained in the sections below is both qualitative and quantitative. Each resource area includes a summary of impacts common to all alternatives, an analysis of impacts for each alternative, and a description of cumulative impacts. **Appendix F**, Analytical Framework, outlines and describes the indicators, analysis areas, and assumptions used for each resource analysis.

This impact analysis identifies impacts that may enhance or improve a resource as a result of management actions, as well as those impacts that have the potential to impair a resource. However, the evaluations are confined to the actions that have direct, immediate, and more prominent effects. If an activity or action is not addressed in a given section, no impacts are expected, or the impact is expected to be minimal based on professional judgment. **Section 1.4.2** in **Chapter 1** describes those resource issues that did not receive detailed analysis. **Appendix C**, Resource Conservation Measures, contains BMPs that could be implemented under Alternatives B, C, and D.

For organizational purposes, **Chapter 3** is divided into sections by subject area (such as water resources, wildlife, and recreation) from the land use planning handbook, BLM Handbook H-1601-1. Though they are described and analyzed in discrete sections, these subjects are dynamic and interrelated. A change in one resource can have cascading or synergistic impacts on other resources. As a result, there is some overlap among the resource sections in **Chapter 3**, and the impacts described in one section may depend on the analysis from another section.

The impact analyses for direct, indirect, and cumulative impacts for all resources are detailed in the sections below. **Appendix F**, Analytical Framework, describes reasonably foreseeable future actions considered in the cumulative impact analyses.

The BLM used GIS data to perform acreage calculations. Calculations depend on the quality and availability of data. Most calculations in this RMP are rounded to the nearest 100 acres or 1 mile. Given the scale of the analysis and the compatibility constraints between data sets, all calculations are approximate; they serve for comparison and analytic purposes only. The BLM may receive additional or updated data; therefore, acreages may be recalculated and revised at a later date.

3.1 AIR RESOURCES

3.1.1 Air Quality

Air quality is measured by the concentration of air pollutants and air quality-related values, such as visibility and atmospheric deposition, within a geographic area. Ecological factors such as wind, temperature, humidity, geographic features, vegetation, and wildfire, as well as human-related activities such as recreation and livestock grazing, have the potential to affect air quality.

Air quality indicators include criteria air pollutants, hazardous air pollutants (HAPs), and sulfur and nitrogen compounds that could contribute to visibility impairment and atmospheric deposition. National and state ambient air quality standards set the maximum thresholds for criteria air pollutants. The federal Prevention of Significant Deterioration program establishes allowable increases of a given pollutant for Class I areas and Class II areas of interest.

The air quality analysis area includes the planning area and any Class I areas within 62 miles, which is considered the distance where adverse air quality impacts (including reduced visibility and environmental damage) would occur. These areas are Bryce Canyon, Capitol Reef, and Zion National Parks (NPS 2022a). Federal agencies are required to manage air quality according to established allowable increases of a given pollutant for Class I and Class II areas, which are discussed in more detail below under visibility.

Affected Environment

Current Conditions

Criteria Air Pollutants and Hazardous Air Pollutants

The EPA, in accordance with the 1963 Clean Air Act, as amended, has established national ambient air quality standards (NAAQS) for six air pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (both particulate matter less than 10 microns in diameter [PM_{10}] and particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), ozone, and lead. The NAAQS include primary standards established to protect public health, including the sensitive populations (such as children, the elderly, or asthmatics), and secondary standards to provide public welfare protection, including protection against decreased visibility and environmental damage (such as crops, vegetation, animals, and buildings). Current EPA-designated NAAQS for criteria pollutants are listed on the EPA website at <https://www.epa.gov/criteria-air-pollutants/naaqs-table>.

The Clean Air Act requires the EPA to periodically review and update the NAAQS, as necessary, to ensure they adequately protect public health and the environment. Based on the latest health data and scientific evidence, the EPA has proposed to revise the primary (health-based) annual $PM_{2.5}$ standard from its current level of 12 micrograms per cubic meter to a level¹ between 9 to 10 micrograms per cubic meter (EPA 2023a). The Clean Air Scientific Advisory Committee, which was established under the Clean Air Act to provide independent advice to the EPA on the technical bases for NAAQS, has recommended lowering the ozone standard to a level between 0.055 and 0.060 parts per million from its current EPA-recommended standard of 0.070 parts per million (Clean Air Scientific Advisory Committee 2023).

¹ Based on the Clean Air Scientific Advisory Committee's recommendation, the full range of values considered is between 8 and 11 micrograms per cubic meter. The EPA has emphasized comments and feedback on values between 9 and 10 micrograms per cubic meter.

Monitoring stations that collect air quality data in or near the planning area include a Utah Division of Air Quality-operated ozone monitoring station in the town of Escalante in Garfield County (Utah Division of Air Quality 2022), a PM_{2.5} monitoring station in Bryce Canyon National Park², and monitoring stations for nitrogen oxides and particulate matter by the Alton Coal Mine, approximately 10 miles west of the planning area. Air quality sensitive receptors (Class I and Class II areas) and meteorological stations are shown in **Figure 3-1** (Air Quality Sensitive Receptors) in **Appendix A**.

The EPA, in collaboration with state, local, and tribal agencies, compiles a National Emissions Inventory every 3 years. The most recent inventory data from the 2020 National Emissions Inventory (released in 2023) for Kane and Garfield Counties is shown in **Table 3-1**.

Table 3-1. 2020 Emissions Inventory by Source (tons per year)

County	Source	Carbon Monoxide	Nitrogen Oxides	PM ₁₀	PM _{2.5}	Sulfur Oxides	VOCs
Kane	Area source ¹	629.85	43.24	2,285.40	299.32	1.64	257.74
	Oil and gas	0.00	0.00	0.00	0.00	0.00	0.00
	Off-road mobile ²	258.42	11.50	1.85	1.73	0.01	39.60
	On-road mobile ³	1,154.87	250.48	10.44	6.27	0.55	81.79
	Point source ⁴	13.91	0.23	0.31	0.25	0.05	1.17
	Biogenics ⁵	2,707.87	434.66	0.00	0.00	0.00	14,195.77
	Wildfires	7,226.07	792.13	2,564.83	533.70	26.39	15,161.21
	Total	7,226.07	792.13	2,564.83	533.70	26.39	15,161.21
Garfield	Area source ¹	243.07	17.43	1,797.30	242.27	0.82	186.12
	Oil and gas	0.00	0.00	0.00	0.00	1.29	0.00
	Off-road mobile ²	269.53	13.70	2.38	2.23	0.02	52.50
	On-road mobile ³	849.38	197.05	9.17	5.19	0.44	61.39
	Point source ⁴	19.15	0.33	0.44	0.36	0.07	0.68
	Biogenics ⁵	2,874.98	609.28	0.00	0.00	0.00	15,356.04
	Wildfires	23.67	0.53	2.59	2.20	0.24	5.64
	Total	4,039.71	837.79	1,749.63	235.12	2.63	15,629.73

Source: EPA 2023b

¹ Area sources are stationary sources that are too small or too numerous to be treated as individual point sources. Source categories include agricultural and prescribed burning, outdoor grilling and residential wood combustion, trains and commercial marine vessels, and other sources not covered by the point source category.

² Off-road mobile sources include mobile equipment (such as construction, agriculture, industrial, lawn and garden, commercial, logging, recreational vehicles, some recreational marine vehicles, and underground mining equipment) that do not operate on roads, excluding commercial marine vehicles, railways, and aircraft.

³ On-road mobile sources include emissions from motorized vehicles that normally operate on public roadways.

⁴ Point sources include individual facilities such as large energy and industrial sites (such as petroleum refineries, electric generating utilities, and manufacturing facilities), smaller point sources included voluntarily by state, local, and tribal agencies (such as crematoria, dry cleaners, and gas stations), airport operation and aircraft landing and take-off emissions, and locomotive missions within railyards.

⁵ Natural (nonanthropogenic) emissions from forests, vegetation, and soils.

² <https://map.purpleair.com/1/mAQI/a43200/p0/cC0#10.27/37.3715/-112.4033>

Air quality in the planning area is typical of undeveloped regions in the western United States. Kane and Garfield Counties are currently designated attainment/unclassifiable³ for all NAAQS. However, while not a recognized air quality issue in the planning area, ground-level ozone and its precursors (VOCs and nitrogen oxides) are regional concerns and can be transported both into and out of the planning area. Under a new recommended standard for ozone by the Clean Air Scientific Advisory Committee, the current ozone concentration in many parts of western United States, including the planning area, would exceed the NAAQS. Ozone can inflame and damage human airways; cause coughing, difficulty breathing, and sore throat; make lungs more susceptible to infection; and aggravate asthma and other lung diseases. VOCs would be expected to increase during periods of high wildfire or prescribed fire activity. VOCs and smog formation are more problematic during periods of atmospheric stability and in valley bottom areas prone to inversions; they are much less problematic during periods of atmospheric instability (that is, high-velocity, ground-level winds and winds aloft). The main source of VOCs in the planning area is from biogenic sources (98 percent, see **Table 3-1**).

Many VOCs are also HAPs. HAPs, also known as toxic air pollutants or air toxics, include 188 pollutants that are known or suspected to cause cancer and noncarcinogenic respiratory effects, as well as other serious health effects, such as reproductive effects or birth defects, and adverse environmental effects. The AirToxScreen⁴ Tool, developed by the EPA, provides an estimate of ambient concentrations of air toxics and human health risks. This tool shows that in 2019 the total cancer risk from HAPs for Kane and Garfield Counties was 10.74 and 10.16 in a million, respectively (AirToxScreen 2023), which are both below the threshold value of 100 in a million according to 40 CFR 300.430. The hazard index for noncancer respiratory risks in both Kane and Garfield Counties was 0.02; values below 1.0 indicate that air toxics are unlikely to cause adverse noncancer health effects over a lifetime of exposure (AirToxScreen 2023).

Particulate matter can be directly emitted and can form from secondary reactions in the atmosphere. Particulate matter concentrations from wildfires can increase to unhealthy levels in the planning area. Particulate matter contains microscopic solids or liquid droplets, which, when inhaled, affect the lungs and the heart, aggravate asthma, and even enter the bloodstream. PM_{2.5} (fine particles) pose a greater risk to human health and the environment than PM₁₀ (course particles) due to their smaller size; fine particles are also the main cause of haze. Particulate matter concentrations are expected to be higher near towns, unpaved roads that experience high traffic volumes, and areas with depleted vegetation cover. Regional levels are likely a result of wind-borne emissions from fugitive dust sources that occur naturally across the planning area such as dry lakebeds, deserts, dunes, and recovering wildfire areas. The main sources of PM₁₀ emissions in the planning area counties are area sources (99 percent in Garfield County and 89 percent in Kane County), which include a wide range of categories from prescribed fires to outdoor grilling to trains or commercial marine vessels (**Table 3-1**). In Kane County, wildfires were the second major source of PM₁₀ emissions (10 percent). While area sources contributed the largest percentage of PM_{2.5} emissions in both counties (56 percent in Kane County and 94 percent in Garfield County), PM_{2.5} wildfire emissions in Kane County contributed a much larger proportion of total annual emissions (42 percent) than the total annual wildfire emissions of PM_{2.5} in Garfield County (3 percent). Locations vulnerable to decreasing air quality due to particulate matter in the planning area include the immediate

³ Areas that do not meet the national standard are called nonattainment areas. If the air quality in a geographic area meets the national standard, it is called an attainment area (designated “attainment/unclassifiable”); in some cases, the EPA is not able to determine an area’s status after evaluating the available information and those areas are designated “unclassifiable.”

⁴ <https://www.epa.gov/AirToxScreen/2019-airtoxscreen>

operation areas around surface-disturbing activities such as construction of major rights-of-way (ROWs) projects.

Carbon monoxide is produced by the incomplete burning of various fuels. Products and equipment powered by internal-combustion engines, such as portable generators, cars, heavy construction equipment, OHVs, and aircraft also produce carbon monoxide. High concentration of carbon monoxide is harmful to human health; carbon monoxide can reduce oxygen in the blood stream and prevent oxygen from reaching critical organs like the heart and the brain. At very high concentrations (typically indoors), carbon monoxide can cause dizziness, confusion, unconsciousness, and death. Carbon monoxide can also combine with oxygen in the atmosphere to create carbon dioxide (a GHG). In the planning area counties, biogenic factors are a major source of carbon monoxide (38 and 66 percent of total carbon monoxide emissions in Kane and Garfield Counties, respectively). Wildfires contributed a major portion of total annual carbon monoxide emissions in Kane County (34 percent). On-road mobile sources were also a major source of carbon monoxide emissions in the planning area counties (16 percent and 20 percent in Kane and Garfield Counties, respectively; see **Table 3-1**).

In the planning area, nitrogen oxides are emitted from burning of fuel at high temperatures (such as internal-combustion engines). Nitrogen oxides can have both health and environmental impacts. Short-term exposures to high concentrations of nitrogen dioxide (indicator for nitrogen oxide compounds) can aggravate respiratory diseases, particularly asthma, while long-term exposures may contribute to the development of asthma and potentially increased susceptibility to respiratory infections. Nitrogen oxides can also react with other chemicals in the air to form particulate matter and ground-level ozone, as well as acid rain. Nitrate particles that are the result of nitrogen oxides also contribute to regional haze and visibility. In the planning area counties, biogenic sources make up 73 percent of total nitrogen oxide emissions (**Table 3-1**).

In the planning area, sulfur dioxide emissions from human-made source involve burning of fossil fuels, with high-sulfur fuels generally producing higher levels of sulfur dioxide as a byproduct. Short-term exposures of sulfur dioxide can damage the respiratory system and make breathing difficult. Sulfur oxides also react with other compounds in the atmosphere to create particulate matter. At high concentrations, sulfur oxides can damage foliage, decrease growth, and damage ecosystems by contributing to acid rain. In Kane County, the primary source of sulfur dioxide was wildfires (92 percent), while in Garfield County, there were several major contributors, including oil and gas (32 percent), area sources (21 percent), and wildfires (19 percent; **Table 3-1**).

Visibility and Regional Haze

Visibility is “the clarity with which distant objects are perceived” (EPA 2001). It is affected by pollutant concentrations, plume impairment, regional haze, relative humidity, sunlight, and cloud characteristics. A typical visual range without any human-made air pollutants would be about 140 miles in the western states (EPA 2001). Aerosols (small particles made of solid and liquid molecules dispersed in the air) are the pollutants that most often affect visibility in the Class I areas. Five key contributors to visibility impairments are sulfate, nitrate, organic carbon, elemental carbon, and crustal materials.

Visibility can be expressed in terms of deciviews, a measure for describing perceived changes in visibility. One deciview is defined as a change in visibility that is just perceptible to an average person or equivalent to about a 10 percent change in light extinction. To estimate potential visibility impairment, monitored

aerosol concentrations are used to reconstruct visibility conditions for each day monitored. These daily values are then ranked from clearest to haziest and divided into three categories to indicate the mean visibility for all days (average), the 20 percent of days with the clearest visibility (20 percent clearest), and the 20 percent of days with the worst visibility (20 percent haziest).

The Clean Air Act included legislation to prevent future visibility impairment and to remedy existing visibility impairment in Class I areas. Class I air quality areas include national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that existed or were authorized as of August 7, 1977. They receive the highest degree of air quality protection under the Clean Air Act. At present, the EPA monitors visibility in Bryce Canyon National Park, west of the planning area, through a collaborative monitoring program called Interagency Monitoring of Protected Visual Environments, established in 1985 to monitor visibility in Class I areas. Monitoring at nearby Class I areas can inform visibility conditions in GSENM.

Atmospheric Deposition

Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems. It is reported as the mass of material deposited on an area (kilogram per hectare) per year. Atmospheric deposition can cause acidification of lakes and streams. One expression of lake acidification is the change in acid-neutralizing capacity, which is the lake's capacity to resist acidification from atmospheric deposition. Acid-neutralizing capacity is expressed in units of micro-equivalents per liter.

Wet deposition refers to air pollutants deposited by precipitation, such as rain and snow. One expression of wet deposition is precipitation pH, a measure of the acidity or alkalinity of the precipitation. There are five National Atmospheric Deposition Program stations in Utah: Logan, Murphy Ridge, Green River, Bryce Canyon National Park, and Canyonlands National Park. The National Atmospheric Deposition Program stations in Bryce Canyon and Canyonlands National Parks have assessed precipitation chemistry since 1985 and 1997, respectively.

Dry deposition refers to the transfer of airborne gaseous and particulate material from the atmosphere to the earth's surface. The Clean Air Status and Trends network has measured dry deposition of ozone, sulfur dioxide, nitric acid, sulfate, nitrate, and ammonium in the United States since the late 1980s. The closest Clean Air Status and Trends network station to the planning area is at Canyonlands National Park.

Trends

The primary trends that affect the air quality in the planning area include increased recreation-related and wildfires emissions, and increased dust emissions due to longer drought conditions, which are exasperated by climate change. Current trends suggest an increase in recreation and travel to the area. Some recreational visitors engage in motorized activities that represent emission sources in addition to the highway vehicles used for transportation. Climate change trends, such as an increase in the size and frequency of wildfires and a potential increase in wind-borne dust emissions exasperated by drought conditions, pose increasing air quality concerns from these pollution sources.

As discussed above, ozone is a regional problem typical in the western United States. Based on data collected by the Utah Division of Air Quality in town of Escalante and by federal agencies at Bryce Canyon National Park, Capitol Reef National Park, and Glen Canyon, ozone concentrations show a relatively

unchanging trend between 2012 and 2022. **Table 3-2** shows the highest and fourth-highest annual 8-hour ozone concentrations in the planning area between 2012 and 2022. According to the NAAQS, the fourth-highest daily maximum 8-hour ozone concentration, averaged over 3 years, may not exceed 0.070 parts per million. The 3-year average of the fourth-highest annual 8-hour ozone concentrations in the planning area ranged between 0.063 and 0.068 parts per million between 2012 and 2022. Estimates show that while recent regional ozone concentrations remain below the NAAQS, values are just below the current standards and historical data records show past exceedances (EPA 2023c).

Table 3-2. 8-Hour Ozone Concentration (parts per million)¹

Year²	Highest Annual Concentration	Fourth-Highest Annual Concentration
2012	0.074	0.068
2013	0.072	0.067
2014	0.064	0.060
2015	0.073	0.068
2017	0.072	0.068
2018	0.077	0.068
2019	0.064	0.062
2020	0.062	0.060
2021	0.075	0.069
2022	0.068	0.063

Source: EPA 2023c

¹ Data collected at Utah Division of Air Quality monitoring site in the town of Escalante in Garfield County.

² 2016 ozone data not available.

Particulate matter is another issue during dust storms or when kicked up from other activities in this dry region. The BLM regularly authorizes projects that, without adequate mitigation measures applied, would have the potential to raise levels of fugitive dust, PM₁₀, and PM_{2.5}. Locations vulnerable to decreasing air quality due to particulate matter in the planning area include the immediate operation areas around surface-disturbing activities, such as energy and mineral development and construction of major ROW projects.

Prescribed and naturally caused fires present a concern to air quality. Short-term effects on air quality from prescribed fires include a general increase in particulate matter, carbon dioxide, and ozone precursor emissions. Any smoke emissions resulting from annual prescribed burning projects or treatments in the planning area are managed in compliance with guidelines in the Utah Smoke Management Plan and interagency group program (Utah Division of Air Quality 2021). Active group participants include various federal and state agency land managers and the Utah Division of Air Quality. The purpose of this program and the smoke management plan is to ensure mitigation measure implementation to reduce impacts on public health and safety and visibility from prescribed fire and wildland fire used for resource benefits. Compliance with the plan is the primary mechanism for land managers to implement prescribed burns while ensuring compliance with the Clean Air Act. Burn plans written under this program include fire emission minimization actions, exposure-reduction procedures, a smoke dispersion evaluation, and an air quality monitoring plan. The program coordinator reviews proposed burns daily and approves or denies burns based on current weather and air quality conditions.

The visibility trend data from 2011 to 2020 are available from the NPS (NPS 2022b) for Bryce Canyon National Park, Capitol Reef National Park, and Glen Canyon. Improvement in park visibility on the most impaired days has been documented for all three since 2011. However, visibility on the haziest and clearest days has not changed substantially for Bryce Canyon and Capitol Reef National Parks, while Glen Canyon shows improvement for the clearest days. The Clean Air Act's visibility goal requires visibility improvement on the 20 percent haziest days, with no degradation on the 20 percent clearest days. While some visibility impairments are the result of natural, uncontrollable sources, such as windblown dust and soot from wildfires, human-made sources of pollution can also impair visibility. The human-made sources include motor vehicles (organic carbon), electric utility and industrial fuel burning (sulfates and particulate), and manufacturing operations (sulfates and fine particulate matter). Visibility in the area is most influenced by sulfates, coarse particulate matter, and organic carbon.

The Western Regional Air Partnership, in a collaborative effort with state and federal agencies and Tribal Nations, has developed a tool to identify sources and causes of regional haze at all Class I Areas in the United States. In support of the western states' Regional Haze Rule and states' 2028 reasonable visibility progress goals in Class I areas, in addition to visibility trends in Bryce Canyon National Park and Capitol Reef National Park, projections have also been modeled for the year 2028.

According to these data, the 5-year average (2014–2018) visibility in Bryce Canyon National Park on the haziest days has improved by 22 percent, compared with the 2000–2004 5-year average and by 14 percent compared with the 2008–2012 5-year average (Western Regional Air Partnership 2023a). On the clearest days, the 2014–2018 5-year average visibility in Bryce Canyon National Park has improved by 47 percent, compared with the 2000–2004 5-year average and by 20 percent compared with the 2008–2012 5-year average (Western Regional Air Partnership 2023b). In Capitol Reef National Park, the 2014–2018 5-year average improved by 18 percent, compared with the 2000–2004 5-year average and by 12 percent compared with the 2008–2012 5-year average (Western Regional Air Partnership 2023a). On the clearest days, the 2014–2018 5-year average visibility in Capitol Reef National Park has improved by 42 percent, compared with the 2000–2004 5-year average, with no change compared with the 2008–2012 5-year average (Western Regional Air Partnership 2023b). This decrease is primarily due to a decrease in nitrate and sulfate extinction from human-caused sources (Western Regional Air Partnership 2023a, b). Based on modeled projection for 2028, the visibility improvement trend is expected to continue at both locations (Western Regional Air Partnership 2023c).

Total deposition refers to the sum of airborne material transferred to the earth's surface by both wet and dry deposition. The primary gases involved with inorganic nitrogen deposition include ammonia, nitrogen oxides, and nitric acid, while the primary particles are nitrate and ammonium. Agricultural sources are the most common source of ammonium. Total nitrogen deposition is calculated by summing the nitrogen portion of wet and dry deposition of nitrogen compounds. The total sulfur deposition is calculated by summing the sulfur portion of wet and dry deposition of sulfur compounds.

Total deposition has been measured at Canyonlands National Park from 2011 to 2020 (NPS 2022b). Total nitrogen deposition has ranged from 0.7 to 1.7 kilogram per hectare per year between 2011 and 2020. Total nitrogen deposition of 3 kilogram per hectare per year represents the total pollution loading where acidification is unlikely and "below which a land manager can recommend a permit be issued for a new source unless data are available to indicate otherwise" (Fox et al. 1989). Nitrate deposition to terrestrial systems can cause chemical alterations to soil, affecting microorganisms and native vegetation.

The air quality trend at Bryce Canyon National Park does not show substantial change in sulfate concentrations between 2011 and 2020 (NPS 2022b).

Forecast

The forecast for the planning area includes increased tourism and recreation. With the increased travel to the area, there will be increased fuel consumption with the trend for increased levels of VOCs, carbon monoxide, ground-level ozone, nitrogen oxide, and sulfur oxide emissions. With increased OHV recreation in the region, fugitive dust will likely increase across the planning area. Fugitive dust will also increase if climate change yields warmer and drier conditions. If, as some predict, increased precipitation accompanies climate change, the increase in precipitation might help to offset temperature increases that can lead to drier soil conditions.

Environmental Consequences

Refer to **Section F.5**, Air Resources – Air Quality in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management actions and land use allocations contribute to air pollutant emissions and affect air quality and visibility?

Impacts Common to All Alternatives

Management actions that restrict resource use and minimize surface disturbance reduce particulate matter emissions. Under all alternatives, the BLM would manage activities on public land within air quality standards established by the EPA and Utah Division of Air Quality and no less than any local governments' air quality standards. BLM management would, at minimum, be consistent with the federal Class II area standards of visibility (regional haze) criteria, and no less than any local governments' air quality criteria. The BLM would apply mitigation to actions that are shown to exceed ambient air quality standards or adversely affect visibility (regional haze) in the Class I areas. To prevent and reduce air quality impacts from all BLM-authorized activities on BLM-managed lands, the BLM would implement mitigation measures developed on a case-by-case basis through the NEPA or other statutory or regulatory processes. The BLM would evaluate each impact to determine whether it is allowable and acceptable.

Major BLM-authorized activities within GSENM that have the potential to contribute to emissions include travel and transportation management, forestry and woodland products management, vegetation management and prescribed fire, and livestock grazing. **Table 3-3** shows the estimated criteria air pollutant and HAP emissions from quantifiable sources in GSENM. HAPs estimates from non-oil and gas-related activities are approximately 10 percent of total VOC emissions. The nature and types of impacts that are common to all alternatives are discussed below. Estimated emissions are expected to be similar across all alternatives, unless otherwise noted in the analysis presented for the individual alternatives.

Table 3-3. Annual Air Pollutant Emissions by Source (tons per year)

Source	Carbon Monoxide	Nitrogen Oxides	PM ₁₀	PM _{2.5}	Sulfur Dioxide	VOCs	HAPs
Livestock grazing	4.04	10.93	99.44	10.10	0.01	0.35	0.04
Prescribed fires and vegetation management	132.13	1.44	94.19	23.07	0.82	31.00	3.10
Recreation and travel management	24.09	1.76	2,737.94	272.61	0.21	3.80	0.38
Total	160.26	14.13	2,931.57	305.78	1.04	35.15	3.52

Source: Emissions inventory was prepared via personal communication with BLM staff.

Travel Management and Recreation

Motorized travel on unpaved roads and recreational use of OHVs create localized impacts on air quality from fugitive dust emissions. Under all alternatives, the demand for recreation and OHV use is expected to continue growing, resulting in increased travel and associated emissions. Road construction and maintenance activities would also temporarily (during construction) result in increased concentrations of air pollutants locally; however, all such activities on BLM-managed lands would have appropriate measures (such as dust abatement) as part of the permit or contract to reduce impacts on air quality.

In addition to the direct impacts described above, recreation and travel management can have indirect impacts on air quality from windblown erosion caused by disturbance to vegetation and soils or on unpaved roads and trails. Damage to vegetation and increased soil erosion contributes to an increase in fugitive dust emissions, particularly during dry seasons or under drought conditions.

Livestock Grazing

Movement of livestock across the planning area would create short-term, localized dust as livestock cross unvegetated surfaces and dirt trails. Grazing can also affect vegetation cover and soil conditions. This could indirectly affect air quality from wind-borne dust generation of disturbed surfaces. However, under proper management any surface disturbance and associated air quality impacts would be reduced, while rangeland restoration projects that increase vegetation cover can reduce fugitive dust from exposed or disturbed surfaces.

Rangeland improvement, construction, and maintenance activities in GSENM also contribute to fugitive dust and criteria air pollutant emissions; these emissions are created from surface disturbance from vehicular travel on unpaved roads and exhaust from vehicles and fuel-burning equipment. Conversely, rangeland improvement projects can reduce potential fugitive dust emission through improved livestock dispersal, which would result in fewer concentration areas and less surface disturbance.

Fire Management and Vegetation Management

Vegetation management would include a variety of treatment methods, including mechanical and prescribed fire treatments methods. Each of these treatment methods would result in short-term, direct impacts on local air quality through the emission of fugitive dust during vehicular travel on unpaved roads to access the planned vegetation management activity, or prescribed fire smoke, with the greatest emissions occurring from prescribed fire. Treatments that uproot vegetation, such as tilling or harrowing, could have indirect impacts by exposing soils to windblown erosion, while treatments that reduce vegetation height but leave the roots intact would have a lesser potential for indirect impacts. For a

description of different types of mechanical vegetation management and the level of surface disturbance under each method, see **Section 3.3**, Vegetation.

Use of prescribed fires for restoration creates smoke (particulate matter) and other criteria air pollutant and HAP emissions. Prescribed fire is regulated by the State through the Utah Smoke Management Program⁵. This program limits the conditions and timing under which prescribed fire can occur; therefore, complying with these provisions would ensure that prescribed fire treatments would continue to minimize air quality impacts on downwind locations under all alternatives. Over the long term, vegetation management that decreases woody plants and increase grasses and forbs could reduce impacts on air quality from wildfire by decreasing fuel loads, resulting in less area burned and less-intensive fire in areas where these treatments occurred (Jaffe et al. 2020). Maintaining or restoring vegetation communities would have indirect, long-term impacts on the extent that vegetation management creates more resilient vegetation communities that are less prone to wildfire.

Forestry and Woodland Products

Under all alternatives, forestry and woodland products management would be used to promote, sustain, and improve forest health. Timber and woodlands harvest activities in GSENM would result in impacts from equipment operation emissions and surface-disturbing activity. These emissions are much lower compared with motorized recreation, visitation, vegetation management, and prescribed fire emissions and are difficult to quantify; therefore, impacts from forestry and woodland products management are discussed qualitatively.

Forestry and woodlands products management contribute to air pollutant and fugitive dust emissions during and where on-road and off-road equipment is used for timber harvest and treatment of secondary biomass, particularly for commercial harvest. Impacts can also result from prescribed fire or mechanical treatments that may be used where harvest is impractical or demand does not exist. Indirect effects on air quality would occur to the extent that removed products are combusted for wood-burning purposes. Beneficial impacts would include a reduction of emissions from wildfires, which would result from a reduction of fuel loads and biomass.

Alternative A

Under the No Action Alternative, particulate matter generation and impacts on air quality from livestock grazing, commercial and noncommercial timber and fuelwood harvest, and vegetation management would continue at their current levels, while emissions from increased travel to the planning area would continue to increase. Localized impacts on air quality within the 100 acres open to OHV use would continue to occur and increase over time, as described under *Impacts Common to All Alternatives*.

Alternative B

Under Alternative B, there would be no areas open to OHV use, and the portion of GSENM closed to OHV use is 340 times the area closed to OHV use under Alternative A (see **Table 2-1**). OHV travel in the remainder of GSENM would be limited to designated routes, which have road density and siting criteria in some areas. In areas closed to OHV use, emissions from OHVs would be eliminated; however, OHV use would likely relocate and become concentrated in the remaining areas open to OHV use and areas limited to existing and designated use. This would result in increased fugitive dust emissions locally in

⁵ <https://deq.utah.gov/air-quality/smoke-management-program>

those areas. Combustion-related emissions associated with travel and transportation management are anticipated to be similar to those described under Alternative A, with emissions increasing with increasing demand.

Range improvements to increase forage for livestock would be prohibited. Only improvements consistent with the protection of GSENM objects would be permitted; this would minimize the use of fuel-burning equipment for improvement projects and reduce contributions to criteria pollutant emissions from grazing-related activities. Allotments that are not under permit would be made unavailable, further reducing the potential for localized fugitive dust impacts from livestock movement in GSENM.

Impacts from vegetation management activities, particularly impacts from fuel-burning equipment for vegetation management, would be as described under *Impacts Common to All Alternatives*. However, because management actions would prioritize landscape-scale restoration under Alternative B, the risk of future uncontrolled wildfires that would contribute large amounts of pollutants to the atmosphere would also be reduced, compared with Alternative A.

Under Alternative B, commercial harvest of forestry and woodland products would be prohibited, and emissions would be limited to localized impacts from noncommercial harvest.

Alternative C

Under Alternative C, while the type of impacts would be the same as those described under Alternative B and *Impacts Common to All Alternatives*, the level of impacts, specifically those from OHV travel, would be different in some areas. Similar to Alternative B, OHV travel would be more limited than Alternative A, with no areas open to OHV use and larger portions of GSENM closed to OHV travel (411 times the area closed under Alternative A - See **Table 2-1**). In the remainder of GSENM, OHV travel would be limited to designated routes, road density would be minimized, and siting criteria would be identified to ensure resource protection. Emissions would be reduced in closed areas; however, impacts could be concentrated elsewhere in the planning area, especially as demand for OHV use continues to increase.

Impacts from livestock grazing, vegetation management, and prescribed fire would be similar to those described under Alternative B and *Impacts Common to All Alternatives*.

Impacts from forestry and woodland products management would be limited to emissions from noncommercial activity in designated wood harvested areas. Similar to Alternative B, this would result in a reduction of emissions from commercial activity, compared with Alternative A. However, Alternative C would result in the reduction of localized impacts from noncommercial harvest in areas not designated wood harvesting areas, compared with Alternatives A and B.

Alternative D

Under Alternative D, impacts from travel management and livestock grazing would be the same as those described under Alternative B, except where additional areas closed to OHV use have been designated (585 times the area closed under Alternative A; see **Table 2-1**). As described under *Impacts Common to All Alternatives* and Alternative B, localized air quality impacts would be reduced in these areas, while the potential for concentrating activity elsewhere would remain.

Alternative D would prioritize natural processes and could result in increased risk of large wildfires by weakening or defoliating fire-resilient vegetations and increasing potential for growth of fire-prone invasive

grasses like cheatgrass. By limiting suppression tools, Alternative D could also result in less-efficient wildfire management, which can result in larger, more-complex fires that emit large volumes of particulate matter and other criteria air pollutants.

Under Alternative D, commercial timber harvest would be prohibited, and noncommercial harvest would only be allowed if it promotes protection of GSENM objects. Compared with Alternative A, this would result in the largest reduction of emissions and air quality impacts from forestry and woodland products in GSENM.

Cumulative Impacts

The air quality cumulative impacts analysis area includes the planning area, Class I areas within 62 miles of GSENM, and the larger regional area of southern Utah. Past and present actions that contribute to criteria air pollutant and HAP emissions include production from the Alton Coal mine within the KFO administrative boundary, activities from up to 10 producing oil and gas wells and 4 exploration wells in the planning area, ongoing vegetation maintenance (for example, under transmission lines), road construction and maintenance activities (including gravel extraction), and ongoing rangeland maintenance (for example, pipelines, wells, and water catchment projects). Impacts from these projects are expected to continue and contribute to the cumulative air quality impacts in GSENM. In addition, an increasing trend in recreation (including OHV use) and travel to the area is expected to continue to grow.

Among the alternatives, the No Action Alternative would contribute the most emissions to the cumulative air quality impacts from transportation, vegetation, and livestock grazing management activities, particularly if any concurrent activities occur. The management actions under all alternatives would also contribute to short-term cumulative effects from surface-disturbing activities, particularly during concurrent project activities, specifically those that result in fugitive dust emissions. Over the long term, Alternatives B and C would have countervailing effects through proactive vegetation management and fire management, which is expected to reduce the risk of large, uncontrolled wildfires that contribute significantly to local and regional air quality. Less-proactive vegetation and fire management under Alternative D would result in potentially large impacts from wildfires, which, when added to past, present, and reasonably foreseeable future actions, would result in the largest cumulative impacts among Alternatives B, C, and D.

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3.1.2 Climate Change (Including Greenhouse Gases)

Affected Environment

Current Conditions

The planning area is primarily within the Colorado Plateau ecoregion. Ecoregions are large areas of similar climate where ecosystems recur in predictable patterns. The Colorado Plateau ecoregion covers the southeastern half of Utah, western Colorado, northern New Mexico, and northwestern Arizona.

The climate of most of the Colorado Plateau is classified as semiarid and varies from north to south and from low to high elevations. In the north, the climate is closely tied to that of the Great Basin, where summers are hot with infrequent afternoon thunderstorms that tend to occur mostly in higher-elevation areas. In the south, peak precipitation occurs in the winter and again in the summer during a distinct wet period characterized by intermittent but often intense monsoonal storms from southern weather patterns. Spring and fall are generally the driest periods. Annual precipitation amounts are less than 10 inches at the mid- and lower elevations, while areas above 8,000 feet receive over 20 inches of precipitation. The few and highly scattered mountains that reach elevations near or over 11,000 feet can receive nearly 3 feet of precipitation (Bryce et al. 2012).

Temperatures also vary considerably in the ecoregion. In the southern portion of the ecoregion and at lower elevations, temperatures range from approximately 20 to 25 degrees Fahrenheit (°F) (-4 to -6 degrees Celsius [°C]) in the winter to approximately 95°F (35°C) in the summer. At mid- and upper elevations, temperatures range from the single digits and low teens Fahrenheit (-17 to -7°C) in the winter to the low 60s and 70s°F (15 to 21°C) in the summer (Bryce et al. 2012). Based on records from long-term stations, average temperatures (1991–2020) in the mountains of Utah are around 20°F during the winter months, while lower elevations in the southern portion of the state experience days over 100°F (37°C) during the summer (Frankson et al. 2022). The normal mean average annual temperature and precipitation (1991–2020) in the planning area are shown in **Figures 3-2** and **3-3**, respectively, in **Appendix A**.

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as “a change in the state of the climate that can be identified (for example, by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use” (IPCC 2018).

Ongoing scientific research has identified the potential impacts of GHG emissions (including carbon dioxide, methane, nitrous oxide, and several trace gases) on global climate. Through complex interactions on a regional and global scale, these GHG emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused carbon dioxide concentrations to increase dramatically and are likely to contribute to overall global climatic changes.

In the planning area, like in most of the United States, GHG emissions come primarily from the combustion of fossil fuels in energy use. Energy use is largely driven by economic activity, with short-term fluctuations created by weather patterns that affect heating and cooling needs, and changes in the fuel used in electricity generation. In 2020, carbon dioxide emissions from combustion of fossil fuel for energy production in the United States were equal to 73 percent of total U.S. human-caused GHG emissions (U.S. Energy Information Administration 2022). Other major GHGs that are caused by human activity include methane and nitrous oxide. Methane, which largely comes from landfills, coal mines, oil and natural gas operations, and agricultural operations, accounted for up to 11 percent of total GHG emissions in 2020. Nitrous oxide, created primarily from using certain industrial and waste management processes, nitrogen fertilizers, and burning fossil fuels, made up about 7 percent of total human-caused U.S. GHG emissions (U.S. Energy Information Administration 2022).

GHG emissions are offset to some degree by carbon that is sequestered in terrestrial ecosystems. Terrestrial ecosystems on federal lands were estimated to have sequestered an average of 195 megatonnes⁶ of carbon dioxide equivalent emissions (CO₂e) per year nationally between 2005 and 2014; in Utah, the annual average sequestration was 8.6 megatonnes of CO₂e per year (Merrill et al. 2018).

Trends

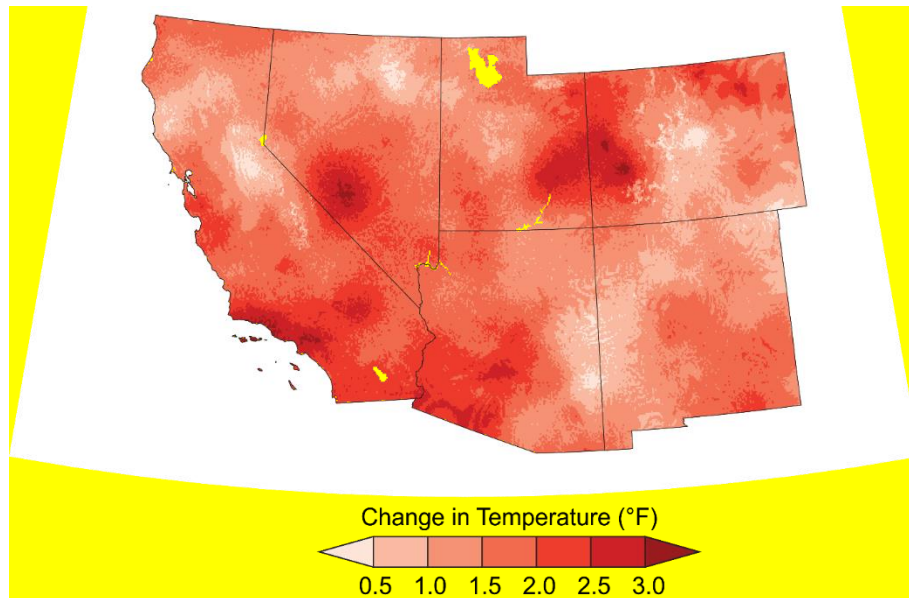
GHGs are necessary to life as we know it because they keep the earth's surface warmer than it otherwise would be. However, as the concentrations of these gases continue to increase in the atmosphere, the earth's temperature is climbing above past levels. Continuing a long-term warming trend, globally averaged temperatures in 2021 were 1.5°F (0.9°C) warmer than the 1951–1980 baseline average, and 1.9°F (1.1°C) warmer than late nineteenth-century levels, representing the start of the Industrial Revolution (National Aeronautics and Space Administration 2022). The 8 years leading up to 2021 were the warmest years since 1880, when modern record keeping began (National Aeronautics and Space Administration 2022). Other aspects of the climate, such as rainfall patterns, extreme drought, snow and ice cover, and sea level, are also changing.

Within the Southwest region of the United States, the average annual temperature increased 1.6°F (0.9°C) between 1901 and 2016 (**Diagram 3-1**). The region recorded more warm nights and fewer cold nights between 1990 and 2016, including an increase of 4.1°F (2.3°C) for the coldest day of the year (Gonzalez et al. 2018). Temperatures in Utah have risen more than 2.5°F (1.4°C) since the beginning of the twentieth century. The period since 2012 has been the warmest on record for Utah, with 8 of the 10 warmest recorded years. The highest number of extremely hot days in the historical record occurred during 2000–2004. The state has experienced a dramatic increase in the number of very warm nights and a decrease in the number of very cold nights.

As the state has warmed, the percentage of precipitation falling as snow during the winter has decreased, as have snow depth and snow cover (Frankson et al. 2022). April 1st snowpack across the state has gradually decreased in the past 40 years, with the 2011–2020 average statewide snowpack approximately 20 percent lower than that observed between 1981 and 1990. Since snowmelt from the snowpack provides water for many river basins, abnormally low winter and spring precipitation is often the trigger for drought conditions (BLM 2022).

⁶ Megatonnes = 1 million tonnes

Diagram 3-1. Change in Temperature Across the Southwest Region of the United States (1901–2016)



Source: Gonzalez et al. 2018

Forecast

According to the IPCC Sixth Assessment Report (AR6), compared with 1850–1900, global surface temperature averaged over 2081–2100 will very likely be higher by 1.8 to 3.2°F (1.0 to 1.8°C) under the very low GHG emissions scenario, by 3.8 to 6.3°F (2.1 to 3.5°C) under the intermediate GHG emissions scenario, and by 5.9 to 10.3°F (3.3 to 5.7°C) under the very high GHG emissions scenario (IPCC 2021).

The annual average temperature of the contiguous United States is projected to rise throughout the century. Increases for 2021–2050 relative to 1976–2005 are projected to be about 2.5°F (1.4°C) for a lower GHG scenario and 2.9°F (1.6°C) for a higher GHG scenario (Vose et al. 2017). Within the Southwest region, which includes the planning area, annual average temperatures are projected to increase by 3.7°F (2.07°C) and 4.8°F (2.7°C) by midcentury (2036–2065) under low and high GHG scenarios, respectively (compared with 1976–2005). By late century (2071–2100), annual average temperatures are projected to increase by 4.9°F (2.7°C) and 8.7°F (4.8°C) under low and high GHG scenarios, respectively (Vose et al. 2017). The frequency and intensity of cold waves is projected to decrease while the frequency and intensity of heat waves is projected to increase throughout the century (Vose et al. 2017).

Climate change modeling predictions show that the Colorado Plateau ecoregion is expected to undergo general warming over the entire region, with the greatest warming occurring in the southern portion of the ecoregion and with average winter temperatures increasing more than average summer temperatures. Climate change modeling predicts up to a 1.1°F (0.6°C) increase (2015–2030) and 1.8°F (1.0°C) increase (2045–2060) in average summer temperatures in the northern portion of the ecoregion and up to a 1.4°F (0.8°C) increase (2015 to 2030) and 2.2°F (1.2°C) increase (2045 to 2060) in the southern portion of the ecoregion (Bryce et al. 2012). Precipitation is expected to decline throughout much of the year during the 2015–2030 period (except for a couple months in the fall), with severe drought likely to occur in some areas. The 2045–2060 period would remain drier (or comparable with historical conditions) during most

of the year, but sporadic wetter months (for example, February, June, and October) could result in overall increases in annual precipitation in some areas (Bryce et al. 2012).

In Utah, climate models estimate a temperature increase of 2.0°F to 5.0°F under a low emission scenario and as much as 15.0°F under a high emissions scenario. Increases in average temperatures will be accompanied by increases in heat wave intensity and decreases in cold wave intensity. Climate model projections of precipitation for Utah, including winter precipitation, are not consistent. However, projected rising temperatures will result in a higher snow line (average lowest elevation at which snow falls). Continuing recent trends, this will increase the likelihood that precipitation will fall as rain instead of snow, reducing water storage in the snowpack, particularly at lower elevations that are currently on the margins of reliable snowpack accumulation. In addition, extreme precipitation is projected to increase, potentially increasing the frequency and intensity of floods (BLM 2022).

Overall, the southern portion of the ecoregion is expected to experience more extreme long-range climate change effects than the northern portion of the ecoregion. This is because the northern portion of the ecoregion is north of the influence of the summer monsoon; the northern portion may also be considered transitional to the mid- and northern latitudes, where climate change predictions may differ from those for the southwestern region (Bryce et al. 2012). Some models predict that winters in mid-latitudes will be wetter as well as warmer (Miller et al. 2011).

The long-term potential for climate change in GSENM ranges between moderate-low to very high. The southern portions of GSENM comprise the largest area with very high potential for climate change. The Escalante Canyons area shows moderate-low to moderate potential for long-term change. The Kaiparowits area shows mostly moderate potential with some areas of moderate-low, moderate-high, and very high potential (BLM 2018).

Environmental Consequences

Refer to **Section F.6**, Air Resources – Climate Change in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- What would be the expected contribution to GHG emissions from proposed management?
- How would proposed management affect long-term carbon storage and sequestration in GSENM?

Impacts Common to All Alternatives

Greenhouse Gas Emissions

Major BLM-authorized activities within GSENM that have the potential to impact GHG concentrations include livestock grazing operations, travel and transportation management, visitation, prescribed fire and vegetation management, and forestry and woodland products management. The impact analysis is based on a quantitative assessment of GHG emissions from these activities, where available, and a qualitative analysis of the effects of these emissions on climate change. Impacts from forestry and woodland products management are discussed qualitatively because emissions would be small, and data were not available to quantify these emissions.

Table 3-4, below, shows the estimated annual GHG emissions from quantifiable sources in GSENM. Estimated emissions are expected to be similar across the alternatives, unless otherwise noted in the analysis presented for the individual alternatives.

Table 3-4. Annual Greenhouse Gas Emissions by Source (metric tonnes per year)

Source	Carbon Dioxide	Methane	Nitrous Oxide	AR6 100-Year CO ₂ e*	AR6 20-Year CO ₂ e**
Livestock grazing	3,411	10,370	0.04	312,463	858,987
Prescribed fires and vegetation management	1,209	6	0.82	1,602	1,901
Recreation and travel management	29,050	1	0.55	29,215	29,241
Total	33,670	10,377	1.41	343,280	890,129

Source: Emissions inventory was prepared via personal communication with BLM staff.

*100-year time horizon global warming potentials applied are carbon dioxide = 1; methane = 29.8; nitrogen dioxide = 273, from the IPCC Sixth Assessment Report (AR6; IPCC 2021).

**20-year time horizon global warming potentials applied are carbon dioxide = 1; methane = 82.5; nitrogen dioxide = 273, from the IPCC Sixth Assessment Report (AR6; IPCC 2021).

When applying the 100-year global warming potentials from the IPCC AR6, the average annual estimated CO₂e from quantifiable emission-generating activities in GSENM comprise approximately 0.5 percent of Utah's total GHG emissions of 72 megatonnes of CO₂e in 2020, and 0.01 percent of U.S. emissions of 5,586 megatonnes of CO₂e in 2021 (EPA 2023). When applying the 20-year global warming potentials from the IPCC AR6, emissions from quantifiable emission-generating activities in GSENM comprise approximately 1.06 percent of Utah's total 84 megatonnes of CO₂e in 2020, and 0.01 percent of U.S. emissions of 7,634 megatonnes of CO₂e in 2021.

The primary difference in quantifiable GHG emissions by alternative is due to differences in livestock grazing AUMs. GHG emissions from other quantified uses are not expected to vary substantially across the alternatives. Differences in GHG emissions from livestock grazing are described under each alternative.

Travel Management and Recreation. Emissions from on-road and off-road vehicles would be a primary source of GHG emissions in GSENM under all alternatives. Direct GHG impacts from recreation and travel management in GSENM include exhaust emissions from vehicles, OHVs (including ATVs/UTVs and motorcycles), and fuel-burning equipment involved in road and facility maintenance and construction projects. Under all alternatives, recreation demand and OHV use is expected to continue growing, resulting in increased recreation and travel-related GHG emissions. Improvements in fuel standards and composition, and an increasing trend in use of electric vehicles, are expected to offset emissions over time.

Recreation and travel can also result in vegetation loss soil disturbance (see **Section 3.2**, Soil Resources, and **Section 3.3**, Vegetation) that release carbon into the atmosphere. This effect would be limited because OHV use would be closed or limited to existing or designated routes throughout GSENM under all alternatives.

Livestock Grazing. Livestock grazing, specifically methane emissions from enteric fermentation and manure deposition (Kauffman et al. 2022), is the dominant source of GHGs in GSENM due to the stronger

radiative forcing of methane, as represented by its higher global warming potential. Emissions of methane from livestock grazing comprise over 99 percent of quantifiable GHG emissions in GSENM. Other potential impacts of livestock grazing that can impact climate change include spread of noxious weeds and plants, as well as the reduction in soil nutrient contents, which exasperate carbon storage and climate change impacts. Conversely, sustainable livestock grazing can have beneficial effects by reducing fuel loads and improving soil conditions and biological diversity. Grazing, under improved management, can increase carbon sequestration potential of the soil and promote root production (Chen et al. 2015).

The net impact of BLM management and allocations in GSENM on carbon stocks is difficult to quantify due to a relative lack of site-specific studies.

Fire Management and Vegetation Management. Prescribed fire and vegetation management in GSENM would emit GHGs under all alternatives. In addition to GHG emissions from the combustion of woody materials in prescribed fires, other sources of GHGs include fuel-burning equipment, such as hand-held chainsaws, off-road heavy equipment (such as masticators, dozers, or tractors), aircraft for seeding, and on-road commuting vehicles used by staff to travel to the project site or transport material.

Under all alternatives, proper fire and vegetation management can help maintain native plants that allow longer periods between wildfire, which would reduce the risk of wildfire (Ypsilantis et al. 2003; also see **Section 3.3**, Vegetation, and **Section 3.13**, Fire and Fuels Management). Prescribed burns would emit substantially less GHGs than wildfires (Wiedinmyer and Hurteau 2010).

With respect to carbon storage and sequestration, while prescribed fires and some vegetation management would reduce carbon storage in GSENM in the short term, vegetation management and prescribed fires are expected to reduce the risk of uncontrolled wildfires that would impact larger areas and result in much greater loss of stored carbon in the long term. Under all alternatives, while prescribed fires would reduce carbon storage temporarily in GSENM, in the long term they would result in an increased carbon storage capacity in GSENM.

Woodlands and Forestry. Forestry and woodland products management, under all alternatives, would result in emissions of GHGs from logging equipment, which would be much smaller and more difficult to quantify, compared with contributions to total GHGs from livestock grazing, wildfires, and motorized travel. As a result, impacts from emissions of GHGs from logging equipment are discussed qualitatively. Impacts can also be the result of GHG emissions from prescribed fire or mechanical treatments that may be used where harvest is impractical or demand does not exist. Indirect effects would occur if removed products are combusted for wood-burning purposes. Beneficial impacts would include a reduction of GHG emissions from wildfires, which, as explained in **Section 3.13**, Fire and Fuels Management, would result from management that would maintain or improve forest and woodland health and reduce the potential for catastrophic wildfire.

Alternative A

Under the No Action Alternative, grazing of up to 107,995 AUMs would result in the grazing-related GHG emissions described in **Table 3-4**. Under current management, creation of new nonstructural range improvements (in the absence of other designation) and any emissions that would result (from burning fossil fuels) would also continue.

Under the No Action Alternative, with current guidance to use the full range of vegetation management methods and tools to prioritize wildlife habitat, forage, and land health, carbon storage and sequestration rates in GSENM would continue at current levels. There would be no ACECs under this alternative, and lands with wilderness characteristics would not receive any special management to protect naturalness under current management. This could impact carbon storage in GSENM indirectly where a lack of protection of resources could contribute to a decrease in long-term carbon sequestration in GSENM.

Alternative B

Alternative B, the 2.7 percent reduction in allocated AUMs compared with Alternative A, would result in an annual grazing-related GHG emissions in GSENM equal to 305,758 tonnes of 100-year time horizon CO₂e and 840,555 tonnes of 20-year time horizon CO₂e (2.7 percent less), from emission of GHGs from quantifiable sources in GSENM. Under this alternative, nonstructural range improvements with the primary purpose of increasing forage for livestock would not be allowed. Also, the BLM would permit improvements only if they are consistent with the protection of GSENM objects; therefore, fewer rangeland construction and maintenance projects would be expected under this alternative, compared with Alternative A, resulting in a decrease in overall GHG emissions from such sources.

Under Alternative B, proactive vegetation management would increase climate resiliency, improving vegetation communities' health in the long term, compared with Alternative A. As described in **Section 3.13, Fire and Fuels Management**, this would result in more frequent, less severe fires that would increase the acres burned than Alternative A and increase the potential for long-term carbon storage and sequestration in GSENM. Management actions and allocations under this alternative would include the addition of special designation areas; conducting landscape-scale restoration projects intended to restore functional vegetation communities, including some lands with wilderness characteristics to be managed to protect such characteristics; and limiting surface-disturbing activities such as rangeland improvements and OHV use. These actions would improve the carbon storage potential in GSENM.

Alternative C

Alternative C, with a 11.7 percent reduction in allocated AUMs compared with Alternative A, would result in an annual grazing-related GHG emissions in GSENM equal to 283,958 tonnes of 100-year time horizon CO₂e and 780,623 tonnes of 20-year time horizon CO₂e. All other impacts, including the potential for long-term carbon storage in GSENM, would be the same as those described under Alternative B.

Similar to Alternative B, Alternative C would increase the potential for long-term carbon storage and sequestration in GSENM. Beneficial impacts would be even greater than those that are expected under Alternative B, due to even greater protective measures for resources under this alternative.

Alternative D

Under Alternative D, with a 58.1 percent reduction in allocated AUMs compared with Alternative A, would result in an annual grazing-related GHG emissions in GSENM equal to 170,383 tonnes of 100-year time horizon CO₂e and 468,398 tonnes of 20-year time horizon CO₂e from quantifiable sources in GSENM.

Alternative D would prioritize natural processes by minimizing active management. Carrying out fewer acres of treatments would mean a continued increased risk of severe fires, which typically result in extensive loss of carbon storage and sequestration. As a result, while higher protective measures under

Alternative D would result in increased potential for carbon sequestration in GSENM, compared with Alternative A, impacts of prioritizing natural processes could have the opposite effect due to the increased risk of large wildfires and the weakening or defoliating of desirable vegetations, which would reduce GSENM's potential for carbon storage.

Cumulative Impacts

Past and present actions that contribute to GHG emissions include production from the Alton Coal mine within the KFO's administrative boundaries, activities from up to 10 producing oil and gas wells and 4 exploration wells, ongoing vegetation maintenance, road construction, and ongoing rangeland maintenance projects that use fuel-burning equipment. Impacts from these projects are expected to continue and contribute to the cumulative GHG emissions in GSENM. In addition, an increasing trend in recreation (including OHV use) and travel to the area is expected to continue growing, contributing further to GHG emissions from vehicles. Improvements in fuel standards and composition, and an increasing trend in use of electric vehicles, is expected to offset emissions over time.

The No Action Alternative would continue to contribute to the cumulative GHG emissions from transportation, vegetation, and livestock grazing management activities that use fuel-burning equipment. The No Action Alternative would further contribute to the cumulative GHG emissions from enteric fermentation of manure from livestock grazing, which would likely increase in the foreseeable future, as the suspended AUMs would be reactivated over time.

Similar to the No Action Alternative, management actions under Alternatives B, C, and D would also contribute to cumulative GHG emissions from management activities that require fuel-burning equipment and from the projected increased travel to the area. In the long term, Alternatives B, C, and D would have countervailing effects from a reduction in AUMs in GSENM, vegetation management, and fire management, which is expected to reduce the risk from large, uncontrolled wildfires that contribute significantly to GHG emissions.

Social Cost of Greenhouse Gas Emissions

The social cost of carbon, social cost of nitrous oxide, and social cost of methane—together, the social cost of greenhouse gases (SC-GHG)—are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year. It includes the estimated value of all climate change impacts, including but not limited to public health effects, changes in net agricultural productivity, property damage from increased flood risk, natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services (U.S. Interagency Working Group on the Social Cost of Greenhouse Gases [IWG] 2021).

On January 20, 2021, President Biden issued Executive Order 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis.⁷ Section 1 of Executive Order 13990 establishes an administration policy to, among other things, listen to the science; improve public health and protect our environment; ensure access to clean air and water; reduce GHG emissions; and bolster resilience to the impacts of climate change.⁸ Section 2 of the order calls for federal agencies to review

⁷ 86 Federal Register 70307 (Jan. 25, 2021)

⁸ Id., Sec. 1

existing regulations and policies issued between January 20, 2017, and January 20, 2021, for consistency with the policy articulated in the order and to take appropriate action.

Consistent with Executive Order 13990, the Council on Environmental Quality (CEQ) rescinded its 2019 “Draft National Environmental Policy Act Guidance on Considering Greenhouse Gas Emissions” and has issued interim NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change and is seeking public comment through April 10, 2023⁹. The CEQ is issuing this guidance as interim guidance so that agencies may make use of it immediately while CEQ seeks public comment on the guidance. The CEQ intends to either revise the guidance in response to public comments or finalize the interim guidance. GHG guidance, effective upon publication, builds upon and updates CEQ’s 2016 Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews.

Regarding the use of social cost of carbon or other monetized costs and benefits of GHGs, the 2016 GHG Guidance noted that NEPA does not require monetizing costs and benefits. It also noted that “the weighing of the merits and drawbacks of the various alternatives need not be displayed using a monetary cost-benefit analysis and should not be when there are important qualitative considerations.”

Section 5 of Executive Order 13990 emphasized how important it is for federal agencies to “capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account” and established the IWG.¹⁰ In February 2021, the IWG published Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990 (IWG 2021). This is an interim report that updated previous guidance from 2016.

In accordance with this direction, this subsection provides estimates of the monetary value of changes in GHG emissions that could result from selecting each alternative. Such analysis should not be construed to mean a cost determination is necessary to address potential impacts of GHGs associated with specific alternatives. These numbers were monetized; however, they do not constitute a complete cost-benefit analysis, nor do the SC-GHG numbers present a direct comparison with other impacts analyzed in this document. SC-GHG is provided only as a useful measure of the benefits of GHG emissions reductions to inform agency decision-making.

For federal agencies, the best currently available estimates of the SC-GHG are the interim estimates of the social cost of carbon dioxide, methane, and nitrous oxide developed by the IWG on the SC-GHG. Select estimates are published in the IWG’s technical support document (IWG 2021), and the complete set of annual estimates is available on the Office of Management and Budget’s website¹¹. The IWG’s SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the models is the discount rate, which is used to estimate the present value of the stream of future damages associated with emissions in a particular year. A higher discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the

⁹ Federal Register: National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change

¹⁰ Executive Order 13990, Sec. 5.

¹¹ <https://www.whitehouse.gov/omb/information-regulatory-affairs/regulatory-matters/#scghgs>

present (that is, future benefits or costs are a less significant factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5 percent, 3 percent, and 5 percent (IWG 2021).

As expected with such a complex model, there are multiple sources of uncertainty inherent in the SCGHG estimates. Some sources of uncertainty relate to physical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

To further address uncertainty, the IWG recommends reporting four SC-GHG estimates in any analysis. Three of the SC-GHG estimates reflect the average damages from the multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of damages estimated, applying a 3 percent annual discount rate for future economic effects. This is a low probability, but high damage scenario, that represents an upper bound of damages within the 3 percent discount rate model. The estimates below follow the IWG recommendations.

The SC-GHGs associated with estimated emissions from quantified GHG emission sources in GSENM are shown in **Table 3-5** to **Table 3-8**. These estimates represent the present value of future market and nonmarket costs associated with carbon dioxide, methane, and nitrous oxide emissions. Estimates are calculated based on IWG estimates of social cost per metric tonne of emissions for a given emissions year and BLM's estimates of emissions in each year. The estimates assume a base year of 2022, with emissions under the RMP running from 2023 through 2045. Values have been rounded to the nearest \$1000.

Table 3-5. SC-GHG Associated with Estimated Emissions from BLM Activities under Alternative A (2020 Dollars)

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO ₂	\$9,385,000	\$35,979,000	\$54,584,000	\$109,295,000
CH ₄	\$142,382,000	\$361,376,000	\$486,740,000	\$962,741,000
N ₂ O	\$160,000	\$564,000	\$849,000	\$1,498,000
Total	\$151,927,000	\$397,919,000	\$542,173,000	\$1,073,534,000

Source: Calculated using social cost per tonne from IWG 2021 and the BLM's estimates of emissions under each alternative

Table 3-6. SC-GHG Associated with Estimated Emissions from Other BLM Activities (2020 Dollars) under Alternative B

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO ₂	\$9,366,000	\$35,903,000	\$54,468,000	\$109,064,000
CH ₄	\$139,465,000	\$353,709,000	\$476,345,000	\$942,274,000
N ₂ O	\$160,000	\$564,000	\$849,000	\$1,497,000
Total	\$148,991,000	\$390,176,000	\$531,662,000	\$1,052,835,000

Source: Calculated using social cost per tonne from IWG 2021 and the BLM's estimates of emissions under each alternative

Table 3-7. SC-GHG Associated with Estimated Emissions from Other BLM Activities (2020 Dollars) under Alternative C

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO ₂	\$9,304,000	\$35,656,000	\$54,092,000	\$108,312,000
CH ₄	\$129,977,000	\$328,781,000	\$442,545,000	\$875,721,000
N ₂ O	\$159,000	\$563,000	\$847,000	\$1,494,000
Total	\$139,440,000	\$365,000,000	\$497,484,000	\$985,527,000

Source: Calculated using social cost per tonne from IWG 2021 and the BLM's estimates of emissions under each alternative

Table 3-8. SC-GHG Associated with Estimated Emissions from Other BLM Activities (2020 Dollars) under Alternative D

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO ₂	\$8,978,000	\$34,372,000	\$52,134,000	\$104,395,000
CH ₄	\$80,553,000	\$198,915,000	\$266,463,000	\$529,007,000
N ₂ O	\$158,000	\$556,000	\$838,000	\$1,477,000
Total	\$89,689,000	\$233,843,000	\$319,435,000	\$634,879,000

Source: Calculated using social cost per tonne from IWG 2021 and the BLM's estimates of emissions under each alternative

As shown in **Table 3-5** to **Table 3-8**, Alternative A would result in the highest value of SC-GHG from quantifiable sources in GSENM (\$397 million at 3 percent discount rate in 2020 dollars). The total SC-GHG estimated for the period between 2023 to 2045 at the 3 percent discount rate under Alternative A would be reduced by 2 percent under Alternative B, 6 percent under Alternative C, and 33 percent under Alternative D. The changes in the SC-GHG relate to projected differences in AUMs under each alternative.

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3.2 SOIL RESOURCES

Biological soil crusts are identified as a GSENM object . According to the Colorado Plateau Rapid Ecological Assessment, biological soil crust is a key conservation element (Bryce et al. 2012).

3.2.1 Affected Environment

Current Conditions

Soil Characteristics

Most soils in the decision area are semiarid, young, and poorly developed. Physical, chemical, and biological soil development processes, such as rock weathering, plant material decomposition, organic-matter accumulation, and nutrient cycling, proceed slowly in this environment. In many areas, natural or geological erosion rates are too fast to develop distinct, deep soil horizons. Most soils in the area range in average depth of 2 to 20 inches (U.S. Department of Agriculture, Natural Resources Conservation Service [NRCS] 2023). The deeper soils are formed in recent alluvium. Almost all the local soils are derived from sedimentary rock. The dominant topographic features are structural benches, mesas, valley floors, valley plains, alluvial fans, stream terraces, hills, cuerdas, and mountainsides. The NRCS has completed soil surveys for the BLM in the area (NRCS 2023).

Dominant soil orders in the decision area are Aridisols, Entisols, and Alfisols; Mollisols and Inceptisols occur less often (**Figure 3-4, Appendix A**). Aridisols are dry soils with low organic-matter content; they tend to have salt accumulations due to an imbalance between evapotranspiration and precipitation. They are sparsely vegetated by drought- or salt-tolerant plants; therefore, erosion by wind and water can be severe. Entisols are soils that have little development and are commonly largely influenced by underlying parent material. Many different parent materials contribute to Entisols' varied soil properties. They are often found in areas where soil material is not in place long enough to form distinctive horizons, or they are associated with parent materials that are highly resistant to weathering (for example, quartz). Alfisols are generally formed under forest or savanna vegetation and display an accumulation of illuvial clay in the subsurface. Mollisols form in semiarid to subhumid areas and are characterized by high base cation saturation and a significant accumulation of humus in the surface horizons. These mineral soils are typically formed under native grass vegetation and may be arable. In the decision area, approximately 212,800 acres are Aridisols, 89,600 acres are Alfisols, 1,445,300 acres are Entisols, and 7,000 acres are Mollisols.

The decision area contains a number of soils with special characteristics that may limit the potential of these soils to be suitable or compatible with certain management activities (Bryce et al. 2012). These soils include, but are not limited to, those that are droughty (marked by little or no precipitation or humidity), shallow, or hydric (permanently or seasonally saturated by water); those that are at a high risk of wind or water erodibility; those that have a low erosion tolerance; those that are shallow, acidic, or gypsiferous (soils containing sufficient quantities of gypsum to interfere with plant growth); desert pavement soils; saline soils; and high calcium carbonate (calcareous) soils.

Soils map units within the decision area have been correlated to specific vegetation communities that are grouped into ecological site groups, as described in **Section 3.3, Vegetation**.

Site Degradation Susceptibility

The NRCS provides ratings for soil susceptibility to degradation from disturbance (Site Degradation Susceptibility Rating [SDSR]), which is defined as a soil's relative resistance to degradation (NRCS 2023). A soil's relative resistance or resilience to change from disturbance varies as a function of soil type, vegetation cover and structure, climate, land use, and disturbance regime. Resistance to degradation also varies across differing temporal and spatial scales. The SDSR considers several factors, including soil's susceptibility to wind and water erosion, salinization, sodification, soil fertility depletion or redistribution, and loss of adequate rooting depth for vegetation (NRCS 2023).

For planning purposes, the BLM has applied categorical SDSR ratings to the decision area to inform management. These categories reflect a soil's limitations or constraints and relative susceptibility to degradation from disturbance (NRCS 2023). A "highly susceptible" rating indicates a soil has one or more features that make the soil very vulnerable to degradation. A "moderately susceptible" rating indicates a soil has features with moderate vulnerability to impacts from disturbance. A "slightly susceptible" rating indicates a soil has features with low vulnerability to degradation. A map of SDSR categories is shown in **Figure 3-5 in Appendix A; Table 3-9** provides a summary of acreage for these categories. Most of the decision area that is mapped for SDSR falls within the "highly susceptible" category (55 percent) and "moderately susceptible" category (30 percent).

Table 3-9. Site Degradation Susceptibility Rating (SDSR) Categories

SDSR Category	Acres*	Percentage of Mapped Areas in GSENM
Highly susceptible	973,200	55
Moderately susceptible	521,400	30
Not rated	227,300	13
Slightly susceptible	37,300	2
Total	1,759,200	100

Source: NRCS 2023

*Not all areas within the decision area have been mapped for soil degradation categories.

Biological Soil Crust

Technical Reference 1730-2, *Biological Soil Crusts: Ecology and Management*, contains a description of the biological soil crust distribution and factors influencing species composition, ecological roles, response to natural and human actions, management techniques, and monitoring methods (Belnap et al. 2001). The document also explains various ecological roles of biological soil crusts. Biological soil crusts comprise cyanobacteria, fungi, and lichen growing in a symbiotic relationship on the soil surface (Bryce et al. 2012). Late-succession crusts commonly appear dark, rough, and pinnacled, where a combination of frost-heaving and dust capture increase surface microtopography. Early succession crusts appear as a smoother, two-dimensional layer on the surface.

Biological soil crusts are an important component of ecosystems in semiarid areas. They may represent up to 70 percent of the living soil cover (Belnap 1995). Research has shown that biological soil crusts provide important contributions to soil stabilization, hydrologic processes, nutrient cycling, and biological diversity in rangeland ecosystems (Miller 2008). Biological soil crusts have a stronger direct effect on surface soil stability than plants or mycorrhizal fungi (Chaudhary et al. 2009). Biological soil crusts are susceptible to damage by compression caused by grazing or off-road driving, and they can be adversely affected by fire.

Bowker et al. 2006 Biological Soil Crust Model

Due to the importance of biological soil crusts in rangeland health, biological soil crust integrity was also assessed in the planning area (Miller 2008). Quantitative data on biological soil crust composition, abundance, and distribution were compared with reference areas; ratings were informed by preliminary results from a concurrent project to develop a spatial predictive model of biological soil crust cover in GSENM (Bowker et al. 2006). Miller (2008) found that fine-loamy soils associated with the semidesert loam ecological site had a high potential to support biological soil crust development. This ecological site corresponds to the Wyoming Big Sagebrush, Saltbush, Blackbrush, Spiny Hopsage, Black Sagebrush, Torrey's Jointfir, Utah Juniper-James' Galleta, and Utah Juniper-Pinyon ecological site types, which are present throughout the planning area.

Given the sensitivity of soils and the high biological soil crust potential of these sites, and the importance that biological soil crusts play in soil stabilization and other rangeland health factors, the functional significance for biological soil crusts in these sites is particularly high (Miller 2008). Biological soil crusts are useful ecological indicators of desert conditions because they are not only sensitive to disturbance, but they respond to disturbances in predictable and quantifiable ways (Bryce et al. 2012). When biological soil crusts are eliminated, so too are the essential functions they provide: nitrogen fixation, carbon storage, the capture of dust and airborne nutrients, moisture retention, and the provision of microsites for native

plant germination (Bryce et al. 2012). Soil crusts may take decades to recover from disturbance. Therefore, soil crusts may be slow to respond to restorative or protective management actions.

Biological soil crusts are ubiquitous within the decision area with the entire decision area exhibiting the potential for biological soil crusts. Maps of potential early and late crust abundance indicate the potential quantitative cover of biological crusts and major crust constituents (mosses, lichens, and dark cyanobacterial crusts) across GSENM (**Figures 3-6** and **3-7** in **Appendix A**). Comparisons of the observed crust distribution with the potential distribution can serve as a surrogate for historical conditions.

Trends

Persistent wind and water erosion of soils are natural phenomena in desert ecosystems. However, human activities, including past mining, recreation, and livestock grazing, disturb the soil surface, affecting protective crusts and vascular plants and exposing underlying soils to wind and water erosion (Bryce et al. 2012). Six livestock grazing allotments did not meet Standard I in the 2006 rangeland health determinations. Since 2006, the BLM, in coordination with livestock grazing permittees, has made changes in the Circle Cliffs, Coyote, Mollies Nipple, Soda, Upper Paria, and Vermilion allotments, which failed to meet Standard I due to livestock grazing. Management interventions include seeding restoration, a seasons-of-use restriction, range improvement maintenance, voluntary nonuse, and feral cattle removal. As a result of these changes, many areas that did not meet standards are now making progress toward doing so (BLM 2018). The BLM continues to monitor and assess rangeland conditions through a variety of landscape-scale and site-specific methods, though few land health assessments in these allotments have been completed since 2006. See **Table 3-84** in **Section 3.16**, Livestock Grazing, for more information.

High soil susceptibility to degradation and decreased soil stability may increase the risk of water erosion within drainage basins, and directly impact water quality. To inform current landscape and soils health within watersheds, and the interrelated impacts on water resources, terrestrial assessment, inventory, and monitoring (AIM) data points were overlaid with the 22 of the 25 hydrologic unit code (HUC) 10 watersheds intersecting GSENM (BLM GIS 2022; **Figure 3-8** in **Appendix A**). A description of watersheds encompassed within GSENM, including the acreage and percentage in the decision area, is presented in **Table 3-34** in **Section 3.4**, Water Resources, *Affected Environment*. Departed watersheds are presented in **Figure 3-24** in **Appendix A** (also see **Appendix B**, AIM Analysis Technical Support Document).

Prior to analyzing each terrestrial AIM plot, benchmarks were needed for each of the 10 soil and vegetation parameters. Benchmark values were established at either the 25th (total foliar, perennial grass, shrub, and litter cover and soil stability) or 75th percentile (bare soil, annual grass, and tree cover; canopy gaps 39 to 78 inches (99 to 198 centimeters); and canopy gaps greater than 6.5 feet (2.0 meters) of all terrestrial AIM points sampled within the respective ecological site group of the AIM plot in question. (For example, an AIM plot sampled in Arid Warm – Sandy Uplands, Loamy Uplands would be compared against all terrestrial AIM plots in that ecological site group.) Indicator values that were below the 25th or above the 75th percentile threshold (depending on the parameter) were deemed to be not meeting expected ecological conditions.

The AIM plots were subsequently aggregated by HUC 10 watershed, and watershed indicators were considered not meeting expected ecological conditions if more than 25 percent of AIM observations per

parameter in each watershed were outside the expected range. Further detail can be found in BLM Tech Note 455, Appendix A. The summary of each HUC 10 watershed is presented in **Table 3-10**.

Table 3-10. Watershed Summary of the Proportion of Terrestrial Assessment, Inventory, and Monitoring (AIM) Points within Each HUC 10 Watershed Meeting Expected Respective Ecological Site Group Conditions

HUC 10 Watershed	AIM Plots (n)	Proportion of Observations Meeting Expected Ecological Site Group Condition (%)		
		Bare Soil Cover	Litter (Herbaceous + Woody) Cover	Soil Stability
Aztec Creek-Colorado River	1	100.0	100.0	100.0
Boulder Creek-Escalante River	14	100.0	78.6	78.6
Croton Canyon	8	87.5	100.0	75.0
Fortymile Gulch-Escalante River	30	76.7	80.0	56.7
Hackberry Canyon-Cottonwood Creek	15	80.0	80.0	73.3
Halls Creek	3	66.7	33.3	66.7
Harris Wash	27	92.6	85.2	85.2
Headwaters Escalante River	1	100.0	100.0	100.0
Headwaters Kanab Creek	52	76.9	88.5	80.8
Horse Canyon-Escalante River	60	83.3	75.0	73.3
Last Chance Creek	37	83.8	89.2	89.2
Lower Wahweap Creek	8	75.0	100.0	62.5
Middle Paria River	15	73.3	100.0	80.0
Sheep Creek	7	71.4	71.4	85.7
Twentymile Wash-Twentyfive Mile Wash	46	67.4	80.4	67.4
Upper Buckskin Gulch	65	67.7	80.0	66.2
Upper Johnson Wash	76	77.6	93.4	85.5
Upper Paria River	29	51.7	82.8	72.4
Upper Wahweap Creek	29	62.1	93.1	72.4
Warm Creek	21	85.7	95.2	90.5
West Canyon Creek-Colorado River	4	75.0	75.0	25.0
White Sage Wash	7	71.4	85.7	85.7

Source: BLM GIS 2022

Figures 3-9 through 3-13 in Appendix A provide an overview of current soil health parameters within the planning area, including bare soil cover change, litter cover change, and biological soil crust cover index (cyanobacteria crust stability index, total lichen cover, and total moss cover) within each watershed. In summary, much of the planning area currently exhibits degraded soil health, though soil health is not uniform across the planning area. Specific information on soil health parameters is included below.

Areas of decreased bare soil cover (based on trends from 1996 to 2021) are scattered across the planning area, while areas of increased bare soil cover are concentrated within the eastern portion of the planning area (**Figure 3-9, Appendix A; Table 3-10**). The distribution of cyanobacteria crust stability index (based on data from 2000 to 2003) shows two areas of lower crust stability within the northeastern and southwestern portions of GSENM (**Figure 3-11, Appendix A**). Higher total lichen cover based on data from 2000 to 2003) in the southern portion of GSENM may indicate that lichen-dominated, late successional biological soil crust communities have established in higher concentrations in those areas. However, total moss cover based on data from 2000 to 2003, which is also indicative of late successional biological soil crust communities, is lower within the central and southern portions of GSENM. In some

areas, total lichen cover is elevated in areas of relatively low moss cover, indicating differences in moss-versus lichen-dominated late successional biological soil crust cover (**Figure 3-13, Appendix A**). These patterns suggest certain areas within the planning area may be more vulnerable to disturbance and may need additional protection measures to minimize impacts on biocrust cover.

Similarly, litter cover change (based on trends from 1996 to 2021) shows decreased litter cover across the planning area and concentrated areas of increased litter cover in the northern portion of the planning area. Patterns of bare soil cover and litter cover change indicate that certain areas may be more vulnerable to disturbance. Additionally, watershed boundaries within GSENM were intersected with soil degradation susceptibility to provide an understanding of soil functional health across the planning area (**Figure 3-5, Appendix A**).

Areas of high soil degradability are uniformly distributed across the planning area, but two watersheds in the southwestern portion of the planning area exhibit overall lower soil degradability than the rest of the planning area. Overall, 21 out of 22 watersheds meet a threshold of 70 percent expected ecological site group conditions for litter cover, and 16 out of 22 for soil stability. Full soil parameter descriptive statistics are presented in **Appendix B**.

Forecasts

The BLM expects human activities to continue to disturb soil surfaces, thereby affecting soil surface conditions and biological soil crusts and exposing underlying soils to wind and water erosion. Climate change is expected to create an amplified hydrological cycle, with extreme cycles of drought and heavy precipitation that will impact soil water availability, soil productivity, vegetation communities, fire regimes, and wind and water erosion.

3.2.2 Environmental Consequences

Refer to **Section F.7, Soil Resources, in Appendix F, Analytical Framework**, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would proposed management affect biological soil crusts?
- How would proposed management affect vulnerable soils?
- How would proposed management affect soil health and ecological function?

Impacts Common to All Alternatives

Several management actions are anticipated to have impacts on soil resources, which are discussed below. Actions that could impact soil resources include ground-disturbing activities associated with ROWs granted; recreation, including camping, hiking, OHV use, and mountain biking; special land use designations; livestock grazing; and vegetation and forest management.

Land management actions, including activities associated with land management actions (for example, ROW development and special land use designations, recreation management, livestock grazing, and vegetation and forest management), would directly and indirectly impact soil resources within the decision area. Ground-disturbing and vegetation removal activities would increase the potential for loss or impairment of soil structure and function and the susceptibility of soils to wind and water erosion. Associated impacts could include soil compaction, loss or displacement of topsoil or protective soil surface

features (for example, biotic soils), mixing of soil horizons, decreased soil stability, increased mass wasting potential, nutrient cycling and ratio impacts, and interference with natural hydrologic properties (for example, infiltration, runoff, and gas exchange). The loss of natural soil structure and function can create a feedback loop that further compounds losses of native vegetation, topsoil, and soil productivity through time.

Impacts from ground-disturbing activities on soil resources may be mitigated through applicable stipulations or measures that address site-specific environmental concerns. Restorative activities conducted in disturbed areas, including reclamation or restoration of natural soil surface or subsurface features, vegetation and forest communities, and geomorphology, have the potential to improve soil ecological function and prevent further soil loss or degradation.

Vulnerable soils are generally more susceptible to ground-disturbing activities with amplified impacts from surface disturbance. Biological soil crusts are fragile and extremely susceptible to physical disruption from foot traffic, grazing, OHVs, and mechanized equipment, which destabilize surface soils. Biological soil crusts remain challenging to restore (Chiquoine et al. 2016). All alternatives would seek to maintain, improve, and restore areas of biological soil crust appropriate for the soil type, climate, and landform. Additionally, all alternatives would aim to facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts.

Under all management alternatives, and on lands managed under the GSENM RMPs (BLM 2020a) and the KEPA RMP (BLM 2020b), procedures to protect soils from accelerated or unnatural erosion from any ground-disturbing activity, including route maintenance and restoration, would be applied.

The impacts of management activities on soil resources vary based on the nature and magnitude of ground disturbance or restorative action and the legacy impacts from previous land use. The following sections summarize the expected impacts of foreseeable management actions and associated activities.

Land Management Actions

Lands and Realty

Land allocations within the decision area would determine the compatible land use and ROW authorizations that would ultimately determine potential impacts on soil resources. Activities associated with areas that are open to ROWs or that are managed as ROW avoidance areas that could impact decision area soils include, but are not limited to, construction of roads, facilities, and structures; vegetation removal or manipulation; overland travel or trampling; vehicle use in authorized areas; grading; and excavation. Activities associated with land allocations would impact soils due to vegetation removal that may increase susceptibility to erosion, soil compaction, and topsoil removal as a result of grading and excavation.

Generally for land allocations, the greater the size of the area and/or the more ground-disturbing activities that are authorized, the greater the potential impact on soil resources from authorized activities that may include vegetation removal, soil excavation, and construction of facilities. Ground disturbance associated with authorized activities also could lead to soil erosion, disturbance of natural soil surface features, and the loss of soil productivity.

Areas that remain or become ROW exclusion areas would be subject to the fewest potential ground-disturbing activities that would impact soil resources. Areas that remain or become ROW avoidance areas would have greater potential for future soil resource impacts resulting from ground disturbance than exclusion areas. Areas that remain or become open to ROW authorization have the greatest potential for ground-disturbing activities that could impact soil resources. Ground-disturbing activities would be expected to have a greater level of impact on vulnerable soils and biological soil crusts than non-sensitive soil types. Likewise, areas identified as having a moderate or high soils degradation susceptibility rating (**Table 3-9**) are expected to have low resilience to impacts from ground disturbance. Management actions that could protect soils from accelerated or unnatural erosion by ground-disturbing and land status activity within authorized ROWs and land allocations include U.S. Department of the Interior and BLM Management of Land Boundaries boundary evidence risk assessment policies and guidance.

Recreation Management

Recreation can cause localized impacts on soil resources and indirect impacts across the landscape. For example, hiking, mountain biking, dispersed camping, overlanding (a blend of car camping and OHV-type use), and OHV use may cause soil compaction, vegetation trampling, habitat fragmentation, increased weed invasion, and greater susceptibility to soil erosion. As hiking and camping (including dispersed camping and overlanding) become more popular, trail and campsite widening can occur, magnifying erosion and increasing the area and depth of soil disturbance. Generally, hiking and mountain bike trail use are localized with impacts on soil resources limited to trailside areas. Informal user trails, side-country networks, and dispersed human impacts can occur; these can result in increased impacts on soil resources.

Similar to camping and mountain biking, the use of OHV on public lands can expand beyond authorized and managed areas and result in increased soil resource impacts. Without adherence to existing and established routes, OHV use has the potential to lead to faster and greater vegetation and soil disturbance than hiking and mountain biking; this is because of OHV weight, size, and travel speed. Dispersed camping and overlanding have a higher likelihood of impacting soil resources due to uninformed travel outside designated camping areas and beyond established OHV routes.

Three types of travel management designations have been defined with variable levels of potential soil disturbance. Areas that are closed to OHV travel would have no OHV-related soil impacts. Areas where OHV travel is limited to designated routes would have some soil impacts, but those impacts would be limited to designated routes where disturbance has occurred previously. Areas that are open to OHV travel would allow unrestricted OHV use; however, those areas would avoid previously undisturbed soils and would limit soil impacts to a confined area where soil resource impacts have occurred previously.

Special designation areas, including wilderness areas, WSAs, and ACECs, would generally have protective impacts on soil resources compared with areas that lack special designation. ACECs would be managed according to their respective management plans but would generally have some restrictions on ground-disturbing activities that would destabilize soils or decrease soil productivity.

Livestock Grazing Management

Livestock grazing management has the potential to cause impacts on soil resources. The level of impacts would depend on the intensity of grazing, range site potential, local climate and weather conditions, and the seasonal timing of use. Depending on site conditions and methods, grazing can cause vegetation loss, declines in soil health, and compaction. Construction of rangeland improvements would cause ground

disturbance and potential compaction or displacement of soils. Vulnerable soils and biological soil crusts would generally be more susceptible to physical impacts from livestock trampling or rangeland improvement construction activities. However, rangeland improvement treatment completed through funding from grazing programs aimed to improve vegetation communities could positively impact soil health (see **Section 3.3, Vegetation**, for a discussion of rangeland improvement programs). In addition, grazing disturbance could result in a shift in biological soil crust community composition toward species that are more resistant to grazing (Concostrina-Zubiri et al. 2014). An increase in grazing-resistant biological soil crust species could increase the recovery rate from disturbance, while simultaneously altering soil and vegetation community composition within these ecosystems.

Vegetation and Forest Management

Desired future conditions for vegetation and forest management emphasize establishment, restoration, and maintenance of sustainable and healthy ecosystems. Restoration activities to move vegetation toward desired conditions would, in theory, support long-term protection of soils from erosion and restoration of natural soil structure, function, and productivity. However, very few studies looking at the long- and short-term effects of vegetation management on soil resources have been completed. Vegetation and forest management activities that cause ground disturbance or remove or change vegetation structure could cause short-term impacts on soil resources, leading to a temporary increase in the soil erosion potential, compaction, or changes to soil structure. For example, invasive or noxious plant treatment and prescribed burns would limit proliferation of treated vegetation. A short-term decrease in vegetation cover could temporarily destabilize soils and increase potential erodibility of soils. If heavy equipment is required for treatments (for example, timber harvesting or tractors for reseeding), this equipment may further disrupt ground cover and compact or disturb soil surfaces.

While these short-term impacts could last up to 5 years, soils are predicted to stabilize as native or desired vegetation structure is established and natural soil protection (such as vegetation debris built up along soil surfaces) accumulates. As new vegetation becomes established in the long term, soils would be expected to stabilize and provide for the establishment of native vegetation. Impacts on vulnerable soils would likely be amplified depending on the nature of vegetation management activities. For example, some biotic soil organisms are sensitive to herbicide application (Von Reis 2015) and very sensitive to any ground disturbance (Belnap et al. 2007); some soil biota also may be damaged by fire (Johansen 2003).

Wildland fires cause complex impacts on soil resources that involve nutrient cycling dynamics, changes to water infiltration and runoff, and erosion susceptibility (Moody and Martin 2009; Moody et al. 2008; Martin and Moody 2001). Fire impacts vary depending on site-specific conditions, including vegetation fire condition class, vegetation community adaptations to fire, burn severity, and pre-burn soil conditions. Loss of vegetation cover and structure from high-severity burns dramatically decreases soil cover, exposing soils to wind and water erosion, destabilizing soils, and increasing mass wasting susceptibility. Fires may also cause changes to soil chemistry and structure, which impact soil productivity and hydrologic function, including development of temporary hydrophobicity and impeded infiltration (Woods et al. 2007).

Fire prescriptions, fuels management, and fire suppression can minimize or mitigate some of these soil resource impacts from high-intensity fires (by reducing the potential for severe fires); however, they may cause some short-term impacts on soils, such as soil compaction or displacement from surface-disturbing fire suppression tactics or fuel treatments and altered soil chemistry from chemical retardants.

The potential impacts on soil resources from various management activities proposed under the alternatives would vary depending on the nature and magnitude of ground disturbance and/or restorative action proposed, the acreage of planned activities, the proximity to sensitive resources, and the existence of legacy impacts from previous land use(s). In general, activities and the associated impacts that would occur similarly across the four alternatives are described and analyzed in *Impacts Common to All Alternatives*. However, as presented in **Chapter 2**, some differences in potential surface-disturbing activities would occur between the alternatives (based on acreage), which would result in varying levels of potential impacts on soil resources. For the purposes of comparison of impacts on soil resources between the alternatives, acreage is used as a proxy for the estimate of potential soil impacts. The subsections below summarize the relative impacts of foreseeable management actions for each project alternative in relation to soil resources.

Alternative A

Alternative A, the existing management option, focuses on continuing existing land management practices and acreages for ROWs; grazing; recreation and OHV use; special designation areas; and forestry, fire, and vegetation management, as guided by existing management plans and guidance. Alternative A would manage uses to prevent damage to and degradation of soil resources and to ensure appropriate soil health is maintained or improved. It also would seek to maintain or enhance soil stability, productivity, and infiltration to prevent accelerated erosion and to provide for optimal plant growth and site potential. Under Alternative A, the BLM would continue to apply current management measures already in use before authorizing surface-disturbing activities. This would be done to reduce impacts in areas such as, but not limited to, the following: areas with high erosion susceptibility, areas susceptible to mass failure, steep slopes, areas with limited to no vegetation, and areas with shallow soil depths.

However, current management plans do not necessarily require actions for maintaining vulnerable soils and biological soil crusts or for restoring areas with soil degradation. They also do not address legacy conditions. Areas with vulnerable soils or degraded areas would continue to be at risk for erosion from authorized activities, resource uses, and natural disturbance(s). Additionally, existing management measures in place do not necessarily meet current standards; they may not take into consideration current technology and mapping, and they may not utilize current science for BMPs to address soil erosion and soil resources.

The *Impacts Common to All Alternatives* section describes impacts of ground-disturbing activities associated with management actions on vulnerable soils, biological soils crusts, and soil health and function. These impacts have the potential to occur under Alternative A on lands that are open to ROW authorizations, OHV use, recreation, and livestock grazing. Below is an overview of the acreages that would be impacted by Alternative A and the activities that could result in impacts on soils.

Under Alternative A, the BLM would continue to manage approximately 630,400 acres as open to ROW authorizations (**Figures 2-26 through 2-29 in Appendix A**). Impacts on soils from ROW activities, as described under *Impacts Common to All Alternatives*, would continue in these areas. Under current management plans, the BLM would continue to manage just under 881,300 acres as ROW exclusion areas (defined as no development activity allowed). Soil erosion and disturbance would continue to be reduced in these areas, thus maintaining soil health and function more effectively than in areas open to ROW authorizations.

Under Alternative A, OHV use would continue to be limited to designated routes on approximately 1,867,300 acres, while 2,800 acres would continue to be closed to OHV use (**Figure 2-26 in Appendix A**). Soil erosion and disturbance as a direct result of authorized recreational uses would be limited in these areas.

The BLM would continue managing 1,865,600 acres under recreation designations (SRMAs and ERMAs). Developed recreation that includes infrastructure, such as roads, parking areas, and facilities, results in ground disturbance during construction and visitor use, which could increase soil disturbance. Direct impacts from recreation activities would limit soil disturbance to those areas authorized for specific recreational impacts. The various acreages are not likely relevant to soil resources as long as changes in surface disturbance do not occur; however; see **Section 3.17, Recreation**, for further information on the magnitude of impacts associated with these management decisions that are not necessarily captured under a strict acreage analysis.

Restrictions on surface-disturbing activities to protect GSENM objects on lands with wilderness characteristics while emphasizing multiple uses, would indirectly protect soil resources in these areas from surface-disturbing activities and would prevent a decline in soil health and productivity. Management of areas with wilderness characteristics could include ROW exclusions and restrictions on travel, energy development, and other surface-disturbing activities if these uses were determined to be incompatible with protection of GSENM objects. Additionally, considering adjacent lands to identify new qualifying areas for lands with wilderness characteristics could reduce effects on soil resources in other areas in the future.

Under Alternative A, the BLM would manage 2,800 acres as ACECs, which would result in restrictions on surface-disturbing activities from OHV use, ROW authorizations, and forest products use.

Under Alternative A, the BLM would continue to manage 2,116,200 acres for livestock grazing, and 125,800 acres would be unavailable for livestock grazing. Impacts on soils from livestock grazing, as described under *Impacts Common to All Alternatives*, would be expected to continue in areas open to livestock grazing.

Under Alternative A, soils with high degradability susceptibility, high bare soil cover, low litter cover, or with biological soil crust occurrence (see **Section 3.2, Soil Resources, Affected Environment** and **Figures 3-5, 3-9, 3-10, and 3-11 in Appendix A**) would be at an increased risk of losing soil function and health as a result of ground-disturbing activities.

Alternative B

Management of soil resources under Alternative B would be more protective than under Alternative A. While Alternative A seeks to maintain and enhance soil stability, a primary objective of Alternative B is to protect and restore soil health, productivity, stability, and infiltration to prevent erosion from disturbance and to provide optimal plant growth and site potential. This alternative would also avoid soil-disturbing actions on vulnerable soils, biological soil crusts, and areas of soil vulnerability (for example, erosion, mass movement, and potential loss of function), and in areas determined as having low restoration potential. If soil-disturbing discretionary actions were to be allowed in areas containing vulnerable soils, a soil health and restoration plan would be developed and approved.

This alternative would promote soil health through the use of active management. For routes designated for public use, future travel management planning (that is, designating routes as open, limited, or closed)

would reduce opportunities for motorized and mechanized travel in areas of highly erodible soils. Additionally, this alternative would require measures to stabilize soils and minimize surface water runoff for actions on slopes greater than 10 percent and avoid soil-disturbing, discretionary actions on slopes greater than 30 percent. These measures would contribute to minimizing the susceptibility of soils to wind and water erosion, and the loss of soil function associated with land management activities. Alternative B would also require a complete land health assessment and, if needed, causal factor determinations within departed watersheds within 2 years of signing the ROD.

The *Impacts Common to All Alternatives* section above describes the impacts of ground-disturbing activities associated with management actions on vulnerable soils, biological soils crusts, and soil health and function. These impacts would apply to soils that would be disturbed under Alternative B. Any activity that results in increased erosion or topsoil disturbance, including ROW authorizations, OHV use, recreation, and livestock grazing, could impair soil health and function, and reduce biological soil crust cover across the planning area. Below is an overview of the acreages that would be impacted by Alternative B and would result in impacts on soils.

Under Alternative B, the BLM would manage 976,400 acres as ROW exclusion areas, compared with 881,300 acres under Alternative A. The BLM would manage 72,000 acres of lands with wilderness characteristics to protect those characteristics, while Alternative A would manage for discretionary use but not actively protect lands with wilderness characteristics. Alternative B proposes the highest area managed as ACECs/RNAs, with 90,680 acres, compared with 2,800 acres under Alternative A.

Under Alternative B, the BLM would manage 2,037,300 acres as available and 204,700 acres as unavailable for livestock grazing. Comparatively, Alternative A would allow 2,134,800 acres for livestock grazing, and 107,200 acres would be unavailable for livestock grazing. Reducing the areas available for livestock grazing would reduce the extent and intensity of effects on vulnerable soils and biological soil crusts. As discussed in the *Trends* section above, much of the planning area currently exhibits degraded soil health, and livestock grazing can contribute to soil health declines. Reducing the areas that are available for livestock grazing under Alternative B would be expected to provide improvements in soil health parameters, including reduction in areas of bare soil, higher litter cover, and increased biological soil crust cover, particularly in vulnerable soil areas that are made unavailable for livestock grazing.

Due to the larger acreage of ROW exclusion, the protection for lands with wilderness characteristics, ACEC management, and land unavailable for livestock grazing under Alternative B than under Alternative A, more soil resources would be protected from surface-disturbing activities, as described under *Impacts Common to All Alternatives*.

Alternative C

In general, management of soil resources under Alternative C would be more protective than under Alternative A. The primary difference with Alternative C's management is that more protective measures would be implemented within the outback and primitive areas. Within the outback and primitive areas, Alternative C would promote soil health primarily through the use of passive management rather than active management. Additionally, soil-disturbing actions on vulnerable soils, biological soil crusts, and areas of soil vulnerability (for example, erosion, mass movement, and the potential loss of function), and in areas determined as having low restoration potential would be prohibited within the outback and primitive areas.

Passive management reduces the short-term direct impacts on soils by limiting direct disturbance caused by implementing management actions within a given area. However, passive management could also result in slow or nonrecovery in many areas, which would negatively impact overall soil health (see discussion of passive management in **Section 3.5.2**, Alternative D). Slow recovery of vegetative cover or changes in the types of vegetative cover (such as increased noxious weeds) could damage soil health by increasing soil exposure, thus exacerbating the potential for soil erosion and degradation.

The *Impacts Common to All Alternatives* section describes impacts of ground-disturbing activities associated with management actions on vulnerable soils, biological soils crusts, and soil health and function. These impacts would apply to soils that would be disturbed under Alternative C. Any activity that results in increased erosion or topsoil disturbance could impair soil health and function and reduce biological soil crust cover across the planning area. Below is an overview of the acreages that would be impacted by specific management actions under Alternative C; these could result in impacts on soils.

Alternative C would allow an intermediate option with 10,900 acres available for ROW applications, compared with 630,400 acres under Alternative A. Alternative C proposes to protect 190,100 acres of lands with wilderness characteristics, while Alternative A would manage for discretionary use but not actively protect lands with wilderness characteristics. Alternative C proposes the highest area managed as ACECs/RNAs, with 57,680 acres, compared with 2,800 acres under Alternative A.

Under Alternative C, the BLM would manage 1,927,000 acres as available and 315,000 acres as unavailable for livestock grazing. Comparatively, Alternative A would allow for 2,134,800 acres for livestock grazing, and 107,200 acres would be unavailable for livestock grazing. Reducing areas available for livestock grazing would reduce the extent and intensity of effects on vulnerable soils and biological soil crusts, and would be expected to provide improvements in soil health parameters, particularly in vulnerable soil areas that are made unavailable for livestock grazing.

Due to the larger acreage of ROW exclusion, the protection for lands with wilderness characteristics, ACEC management, and land unavailable for livestock grazing under Alternative C than under Alternative A, more soil resources would be protected from surface-disturbing activities.

Alternative D

Alternative D would be more protective of soil resources than all other alternatives because it would emphasize the protection, maintenance, enhancement, and/or restoration of soil health, productivity, and stability. A primary objective of Alternative D as it relates to soil resources is to protect, maintain, enhance, and/or restore soil health, productivity, stability, and infiltration to prevent erosion from disturbance and to provide for optimal plant growth and site potential. For example, this alternative would prohibit soil-disturbing, discretionary actions on slopes greater than 30 percent, except for emergency stabilization.

Areas of biological soil crusts would be maintained, improved, and restored; this is similar to the objective outlined under Alternative A. Alternative D would promote soil health primarily through the use of passive management. Passive management reduces the short-term direct impacts on soils by limiting direct disturbance caused by implementing management actions within a given area, but could also result in slow or nonrecovery in many areas, which would negatively impact overall soil health (see discussion of passive management under Alternative C, above).

Additionally, for routes designated for public use, future travel management planning (that is, designating routes as open, limited, or closed) would eliminate motorized and mechanized travel in areas of highly erodible soils. Alternative D would also require a complete land health assessment and, if needed, causal factor determinations across GSENM within 10 years of signing the ROD.

The *Impacts Common to All Alternatives* section describes impacts of ground-disturbing activities associated with management actions on vulnerable soils, biological soil crusts, and soil health and function. These impacts would apply to soils that would be disturbed under Alternative D. Any activity that results in increased erosion or topsoil disturbance could impair soil health and function and reduce biological soil crust cover across the planning area. Below is an overview of the acreages that would be impacted by Alternative D; these could result in impacts on soils.

Alternative D is the more restrictive option for acreage open for ROW usage (2,300 acres) compared with Alternative A, which would manage 630,400 acres open for ROW usage. Of the four alternatives, under Alternative D the BLM would manage the largest area for the protection of wilderness characteristics (559,600 acres), whereas Alternative A would not identify management actions specific for the protection of wilderness characteristics. Under Alternative D, the BLM would manage 2,800 acres as ACECs/RNAs, which would result in restrictions on surface-disturbing activities from OHV use and ROW authorizations; this is the same acreage as under Alternative A.

Alternative D would be the most restrictive for livestock grazing with 1,150,000 acres open and 1,092,000 acres unavailable to grazing. Comparatively, Alternative A would allow 2,134,800 acres for livestock grazing, and 107,200 acres would be unavailable for livestock grazing. Reducing areas available for livestock grazing would reduce the extent and intensity of effects on vulnerable soils and biological soil crusts, and would be expected to provide improvements in soil health parameters, particularly in vulnerable soil areas that are made unavailable for livestock grazing.

Due to the larger acreage of ROW exclusion, the protection for lands with wilderness characteristics, and land unavailable for livestock grazing under Alternative D than under Alternative A, more soil resources would be protected from surface-disturbing activities.

Cumulative Impacts

The cumulative impacts analysis for soil resources is restricted to the decision area and considers historical events and activities, ongoing trends, and reasonably foreseeable future actions. The analysis considers the combination of human activities, natural events, and exacerbating effects associated with climate change.

ROW leases associated with infrastructure development projects are expected to increase in the future. These would include projects such as utility lines, access roads, and waterlines. Specific projects include the Skutumpah road paving, the Garkane Transmission ROW (Buckskin to Fredonia Powerline), the Lake Powell Pipeline ROW, and three Title 23 ROWs. Any ongoing or proposed ROW development projects would increase the total footprint of disturbed soils within the decision area, which would have an additive effect from any vegetation removal and manipulation, grading, excavation, and soil displacement. Effects would include the temporary loss of soils through erosion and decreased soil productivity.

Recreation and visitor use are expected to increase in the future. The activities identified as having growth potential include hiking, backpacking, mountain biking, OHV use, and applications for SRPs and recreational use permits. Impacts from all these activities would primarily be localized to existing and established trails

and routes; therefore, losses to soil resources would be limited to those areas. However, travel outside designated or existing routes and creation of social trails have occurred and will likely occur within the decision area; these would expand the footprint of soil disturbance and the potential for soil erosional losses. While projects such as the East Zion Initiative and the Calf Creek Recreation Area Site may expand the footprint of soil disturbance, they would also disperse visitors out of GSENM, thus reducing potential soil disturbance within GSENM.

Trends in livestock grazing would depend on a number of environmental factors; however, the BLM would continue to evaluate rangeland health to ensure no substantial loss of soil productivity occurs in response to changes in grazing management.

Vegetation communities are expected to be strongly impacted by climate change, increased frequency and intensity of fires, insect and disease outbreaks, weed infestations, and ongoing drought conditions. Some vegetation communities are projected to drastically change in response to these changes, including shifts in evergreen forests and expansion of grassland communities in some areas. Any dramatic shifts in vegetation community structure, as would occur in responses to catastrophic fires and landslides, would be accompanied by soil instability and erosional losses until landscapes reach equilibrium under new vegetation communities. Vegetation management projects aimed at reducing hazardous fuels and undesirable vegetation, including the Pine Hollow Fire Stabilization and the Wire Pass Fire Emergency Stabilization and Rehabilitation Projects, would be aimed at creating more resilient landscapes with more stable soil surfaces that are less prone to erosional losses and mass wasting. While these vegetation management projects would result in short-term adverse impacts on soils, they are expected to have a net long-term benefit to soils.

3.2.3 References

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3.3 VEGETATION

3.3.1 Affected Environment

Current Conditions

Terrestrial Vegetation

Terrestrial vegetation includes plant species not associated with rivers, creeks, lakes, springs, wetlands, or other surface or shallow subsurface water. Most decision area vegetation is terrestrial. Terrestrial vegetation provides an enormous variety of functions in an ecosystem¹² and provides uses for humans and a variety of wildlife species. Healthy and diverse terrestrial vegetation provides ecosystem benefits, including stabilizing soils, preventing erosion, capturing and storing atmospheric carbon dioxide, releasing oxygen, increasing species diversity, providing habitat and food for animals, and providing resources for human use. For analysis on riparian areas, see **Section 3.4**, Water Resources.

Currently, due to past and ongoing climate-related factors (see **Section 3.1.2**, Climate Change (Including Greenhouse Gases)), fire suppression, and livestock grazing, there are areas of high fuels loads across broad, remote landscapes. These fuels loads pose management challenges in terms of the method (for example, prescribed fire) and outcomes (for example, the potential for noxious and invasive infestations), as well as management of human safety during wildfire response. Many BLM land management policies are directed toward managing for healthy vegetation communities that support resistant and resilient ecological systems.

Existing Vegetation Type

The LANDFIRE existing vegetation type product represents the current (through 2016) distribution of terrestrial ecological systems (LANDFIRE 2022). LANDFIRE defines terrestrial ecological systems as groups of plant community types that tend to co-occur throughout landscapes with similar ecological processes, substrates, and/or environmental gradients. Acres of LANDFIRE existing vegetation types in the decision area are summarized in **Table 3-11**. Additionally, **Figure 3-14**, **Appendix A** displays the 12 dominant vegetation types found in the decision area. In **Figure 3-14**, vegetation types comprising less than 10,000 acres are combined into the "other" vegetation category for display purposes. Detailed descriptions of the ecological systems are available in NatureServe's International Ecological Classification Standard (NatureServe 2009).

Table 3-11. LANDFIRE Existing Vegetation Types in the Decision Area

Ecological Systems Code	Existing Vegetation Type	Extent (Acres)¹
7016	Colorado Plateau Pinyon-Juniper Woodland	506,400
7102	Colorado Plateau Pinyon-Juniper Shrubland	347,600
9001	Colorado Plateau Mixed Bedrock Canyon and Tableland	314,800

¹² Ecosystems reflect complex sets of interactions between diverse components, including plants, animals, soil, water, air, geography, climate, humans, and disturbance regimes, such as fire.

3. Affected Environment and Environmental Consequences (Vegetation)

Ecological Systems Code	Existing Vegetation Type	Extent (Acres)¹
7078	Colorado Plateau Blackbrush-Mormon-tea Shrubland	306,500
7080	Intermountain Basins Big Sagebrush Shrubland	130,400
7127	Intermountain Basins Semi-Desert Shrub-Steppe	55,100
7081	Intermountain Basins Mixed Salt Desert Scrub	41,000
9009	Intermountain Basins Shale Badland	31,400
7093	Southern Colorado Plateau Sand Shrubland	30,200
7066	Intermountain Basins Mat Saltbush Shrubland	17,400
7086	Rocky Mountain Lower Montane-Foothill Shrubland	14,100
9336	Great Basin and Intermountain Ruderal Shrubland	13,800
9004	Intermountain Basins Active and Stabilized Dune	9,400
7064	Colorado Plateau Mixed Low Sagebrush Shrubland	7,300
7107	Rocky Mountain Gambel Oak-Mixed Montane Shrubland	6,400
9018	Rocky Mountain Cliff Canyon and Massive Bedrock	5,900
7299	Developed Roads	4,600
7153	Intermountain Basins Greasewood Flat	3,900
7126	Intermountain Basins Montane Sagebrush Steppe	2,800
7135	Intermountain Basins Semi-Desert Grassland	2,800
7904	Western Cool Temperate Urban Shrubland	2,400
7987	Western Cool Temperate Pasture and Hayland	2,200
7054	Southern Rocky Mountain Ponderosa Pine Woodland	1,600
9308	Great Basin and Intermountain Introduced Annual Grassland	1,300
7051	Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland	1,200
9307	Great Basin and Intermountain Introduced Annual and Biennial Forbland	1,000
9019	Rocky Mountain Lower Montane-Foothill Riparian Woodland	800
9309	Great Basin and Intermountain Introduced Perennial Grassland and Forbland	700
7903	Western Cool Temperate Urban Herbaceous	600
9827	Interior West Ruderal Riparian Scrub	500
7901	Western Cool Temperate Urban Evergreen Forest	400
7086	Rocky Mountain Lower Montane-Foothill Riparian Shrubland	100
7933	Western Cool Temperate Developed Shrubland	100
9828	Interior Western North American Temperate Ruderal Grassland	100
7295	Quarries-Strip Mines-Gravel Pits-Well and Wind Pads	100
7965	Western Cool Temperate Close Grown Crop	100
7296	Developed-Low Intensity	100
9328	Interior Western North American Temperate Ruderal Shrubland	100
9011	North American Arid West Emergent Marsh	100
9327	Interior West Ruderal Riparian Forest	100
7145	Rocky Mountain Subalpine-Montane Mesic Meadow	100
N/A	Other ²	100
Total		1,865,600

Source: BLM GIS 2022

¹ Rounded to the nearest 100 acres

² There are 23 additional LANDFIRE Existing Vegetation Types totaling approximately 100 acres throughout GSENM. These are not shown in the table.

In addition to the general vegetation types, multiple unique species are found throughout GSENM. Some of these species are endemic to the region while others are rare throughout the southwestern United States. The Higgins spring parsley (*Cymopterus acaulis* var. *higginsii*), Kane breadroot (*Pediomelum megalanthum* var. *epipsilum*), tropic goldeneye (*Heliomeris soliceps*), Atwood’s pretty phacelia (*Phacelia pulchella* var. *atwoodii*), Smoky Mountain globemallow (*Sphaeralcea fumariensis*), and Atwood evening primrose (*Chylismia atwoodii*) are just a few of the distinctive species that can be found in the various ecotones throughout GSENM.

Ecological Site Groups

Ecological site groups are generalized groupings of U.S. Department of Agriculture, NRCS ecological sites. Ecological site groups incorporate additional context and information about how landscapes may respond to management. Nauman et al. (2022) generalized the ecological site concepts based on unifying underlying soil geomorphology and climate patterns to delineate ecological site groups in the Upper Colorado River region, which includes the planning area. The ecological site groups and their extent in the decision area are summarized in **Table 3-12** and shown in **Figure 3-15, Appendix A**.

Ecological site groups have been delineated using a variety of data and information, including all ecological site descriptions (ecological sites based on NRCS Soil Survey vector polygons) in GSENM. This process was completed and described in detail in *A Quantitative Soil-Geomorphic Framework for Developing and Mapping Ecological Site Groups* (Nauman et al. 2022). Because of the scientific approach and degree of quantification to create these ecological site groups, and the nuance of information they provide, the BLM is using them as a basis for developing the RMP.

A brief introduction is provided here to ecological site groups and their utility to indicate one important approach that is used as a foundation for assessing vegetation conditions in GSENM. Ecological site groups integrate soil geomorphic units with climate information. **Table 3-13** is adapted from Table A.2 from Nauman et al. (2022) and provides general soil geomorphic unit descriptions. Table A.2 contains brief narratives for individual soil geomorphic units that relate to ecological site group designations. Soil geomorphic units encompass topographic mediation of moisture, soil salinity, soil depth, slope, rock content, and soil texture (Nauman et al. 2022). When combined with climatic factors, these units make up the 32 ecological site groups in GSENM.

Table 3-12. Ecological Site Groups in the Decision Area

Ecological Site Group¹	Extent (Acres)²
Arid Warm Sandy and Loamy Uplands	377,700
Arid Warm Shallow	305,500
Arid Warm Very Shallow	289,100
Semiarid Warm Shallow and Deep Rocky	252,100
Semiarid Warm Sandy and Loamy Uplands	187,900
Semiarid Warm Very Shallow	78,100
Arid Warm Breaks	70,100
Outcrops	62,900
Semiarid Warm Finer Uplands	53,500
Arid Warm Deep Rocky	47,100
Semiarid Warm Breaks	31,000
Arid Warm Finer and Clay Uplands	26,100
Arid Warm Saline Uplands	21,800
Semiarid Warm Sandy and Loamy Uplands	18,200

Ecological Site Group ¹	Extent (Acres) ²
Arid Warm Sandy Bottoms	18,100
Arid Warm Saline Hills	11,300
Arid Warm Saline Bottoms and Bottoms	6,000
Semiarid Warm Sandy Bottoms and Bottoms	5,500
Arid Warm Gypsum	4,600
Riparian	3,400
Semiarid Cool Shallow	3,000
Semiarid Warm Saline Hills	2,400
Semiarid Cool Deep Rocky	2,000
Semiarid Warm Saline Uplands	1,700
Semiarid Warm Saline Bottoms	1,600
Semiarid Cool Very Shallow	700
Semiarid Cool Breaks	600
Semiarid Cool Saline Sandy Loamy and Finer Uplands	500
Semiarid Warm Clay Uplands	300
Semiarid Warm Gypsum	200
Semiarid Cool Clay Uplands	<100
Semiarid Cool Bottoms	<100
Semiarid Cool Sandy Bottoms	<100

Source: Nauman et al. 2022; BLM GIS 2022

¹ For a crosswalk of ecological sites to ecological site groups, see the supplementary materials in Nauman et al. 2022.

² Rounded to the nearest 100 acres

Table 3-13. Geomorphic Unit Descriptions Adapted¹

Soil Geomorphic Unit	Soil-Landform Setting Key	Dominant Plant Communities	Notable State and Transition Model Features
Outcrops	Areas dominated by bedrock outcrops (equal to or greater than 75 percent) with only small pockets of soil that may support vegetation.	Very low productivity areas with vegetation sparse and spread out in pockets or fissures. Outcrops with more fractured bedrock can support more vegetation.	Not applicable
Riparian	Variety of soils in floodplains or areas with perennial plant or trees with available water tables or surface water.	Dominated by obligate riparian vegetation (for example, <i>Salix</i> spp., <i>Populus</i> spp., <i>Carex</i> spp., etc.) and usually very high production.	Aridification, gullyng, or channelization can cause these sites to irreversibly revert to bottoms or uplands.
Saline Bottoms	Gently sloping, low-lying areas that receive excess moisture beyond ambient precipitation (run-on or subsurface moisture). Most have ephemeral washes and streams (not perennial). Soils are influenced by salts and have subsurface* soil electrical conductivity greater than 4 decisiemens per meter (saturated paste).	Higher productivity than other saline groups. Alkali sacaton and black greasewood are common dominant species. Generally more grass-dominated when in a reference state.	Gullyng or channelization can lead to alternative states or cause these sites to irreversibly revert to uplands. Salts also make them less resilient to surface disturbance. Greasewood and other shrubs often increase in alternative states.

3. Affected Environment and Environmental Consequences (Vegetation)

Soil Geomorphic Unit	Soil-Landform Setting Key	Dominant Plant Communities	Notable State and Transition Model Features
Sandy Bottoms	Other gently sloping, low-lying areas that receive excess moisture beyond ambient precipitation (run-on or subsurface moisture). Most have ephemeral washes and streams (not perennial). Soils are sandier, averaging greater than 50 percent sand and less than 27 percent clay in both surface** and subsurface horizons.	Diverse shrubs and C4*** grasses often dominate. These sites have higher productivities than upland counterparts. Can support big sage in semiarid climate zones (aridity index equal to or greater than 0.144).	Often more prone to bare ground exposure and associated wind erosion. Can become an aeolian sand source for downwind dunes. Also highly prone to loss of perennial species.
Bottoms	Other gently sloping, low-lying areas that receive excess moisture beyond ambient precipitation (run-on or subsurface moisture). Most have ephemeral washes and streams (not perennial).	Dominated by grasses and shrubs associated with run-in landscape settings (higher surface or groundwater available). Basin big sage can dominate. These sites have higher productivities.	Gullying or channelization can cause state transition or even irreversible reversion to uplands. Woody encroachment is also commonly observed in these areas.
Gypsum	Upland**** areas with soils averaging greater than 5 percent gypsum in the surface or greater than 10 percent gypsum in the subsurface, but with a surface sodium adsorption ratio less than 8. These areas are often hilly badlands but can also be more gentle terrain.	Sub-shrublands with limited grasses dominated by C4 species and low overall productivities. The species composition is determined by gypsum tolerance. They often have very high biological soil crust cover.	Favor biological soil crust development. Have the least number of documented alternative states, indicating a high resistance to state change. Limited annual and shrub invasions have been observed.
Saline Hills	Other upland areas that are highly salt limited (often sodic), erosion features common, often dissected badland hillslopes. These soils include surface sodium adsorption ratios greater than 7 and/or average electrical conductivity greater than 4 decisiemens per meter in surface or average electrical conductivity greater than 8 decisiemens per meter in subsurface.	Mat, Castle Valley, and Gardner's saltbush often dominate with associated salt-tolerant species. Low productivity with even grass and shrub production in reference communities.	Erosion prone, especially with disturbance that exposes bare ground. Can lose perennial grasses and increase in shrub dominance. Often invaded by annuals (for example, cheatgrass [<i>Bromus tectorum</i>], <i>Salsola</i> spp., and <i>Halogeton glomeratus</i>).

3. Affected Environment and Environmental Consequences (Vegetation)

Soil Geomorphic Unit	Soil-Landform Setting Key	Dominant Plant Communities	Notable State and Transition Model Features
Saline Uplands	Other uplands with moderate salt limitations, including average surface electrical conductivity greater than 1.5 decisiemens per meter or average subsurface electrical conductivity greater than 2.	Salt-tolerant grasslands with moderate salt-tolerant shrub component (for example, shadscale and low sage). Moderate to moderately low productivity.	Less susceptible to herbaceous and woody invasion, as well as erosion and bare ground than similar soil geomorphic units with more or less salinity.
Breaks	Other uplands on steep slopes (greater than 35 percent) and rocky soils with greater than 40 percent (by volume) rock content in surface soil horizons.	Very low productivity areas that favor woody species or resilient forbs. Vegetation is often sparse and limited by unstable slopes, poor water retention, and high rock content.	Particularly susceptible to cheatgrass and other annual invasions. Few other alternative state issues observed.
Very Shallow	Other uplands with soils less than 12 inches (30 centimeters) depth until a bedrock contact. Sites are often rocky and rugged.	Generally low production with an even mix of trees (above a certain aridity level), shrubs, and grasses. Blackbrush can dominate in drier areas.	Drought prone and susceptible to annual invasion. Can have bare ground states, erosion issues, and perennial loss of both grass and woody species.
Shallow	Other uplands with soils less than 22 inches (55 centimeters) to a bedrock contact.	Commonly low to moderately productive pinyon-juniper woodlands, but also supports substantial grass and shrub components that vary in relative abundance by climate. Blackbrush can dominate in drier areas.	Drought prone and susceptible to annual invasion. More woody encroachment than Very Shallow. Bare ground, biocrust loss, eroded, and perennial loss states possible.
Deep Rocky	Other uplands with soils that average greater than 30 percent rock fragments by volume in either surface or subsurface horizons. Often rugged topography but can be high-energy alluvial deposits. These soils also tend to have high calcium carbonate contents.	Exhibit a wide variety of dominant grasses, shrubs, and trees, including blackbrush, big sagebrush, and juniper at lower elevations. Generally moderate to moderately high production. Species composition is generally very mixed among species and functional groups.	High propensity for herbaceous invasion, moderate for woody encroachment. Resistant to erosional states, but moderately susceptible to bare ground and perennial loss states
Clay Uplands	Other uplands with average surface clay greater than 30 percent or subsurface clay averaging greater than 35 percent. These sites often exhibit vertic (shrink/swell) properties.	Productive savannas and grasslands often dominated by grasses more adapted to shrink-swell soils. However, big sage can dominate these areas in wetter climates.	Moderate water erosion, herbaceous invasion, and bare ground state risk. Common loss of perennial grasses and woody encroachment.

Soil Geomorphic Unit	Soil-Landform Setting Key	Dominant Plant Communities	Notable State and Transition Model Features
Sandy Uplands	Other uplands with very sandy eolian and alluvial deposits that average greater than 75 percent sand in both surface and subsurface horizons. These soils are generally quite young and low in carbonates (less than 10 percent—usually less than 5 percent).	Productive savannas and grasslands with substantial shrub component (primarily four-wing saltbush, but with some sand sage, blackbrush, <i>Ephedra</i> spp., and big sage on wetter sites). Blackbrush can dominate this group as a long-term state, but it is less common than on shallow sites or sites with calcic horizons and slightly finer textures. Dunes have been described as a reference state possibility for the driest and most exposed areas. Big sage can also dominate in wetter climates.	Drought and disturbance can cause severe wind erosion and dune mobilization. Sites with water erosion issues have also been observed. There is a high propensity for annual invasion, woody encroachment, and perennial species loss (particularly grass). There is also a moderate risk of bare ground states.
Loamy Uplands	Other uplands with surface soil textures of Sand, Loamy Sand, or Sandy Loam, but finer subsoil field textures or carbonate content higher than 10 percent.	Grasslands and savanna communities. Some areas have blackbrush communities that can dominate, but often in mosaic with grasslands as a long-term state. Big sage and other shrubs can also dominate.	Similar to Sandy Uplands, but with less risk of most alternative states and no erosional states related to water erosion documented.
Finer Uplands	Other uplands that tend to have finer loamy textures.	Savannas and shrublands with grasses; these are mostly dominated by Wyoming big sage at middle elevations, but include some sites dominated by winterfat and other shrubs.	High risk of herbaceous invasion, woody encroachment, perennial species loss, and bare ground states. Some documentation of eroded states.

Source: Adapted from Nauman et al. 2022, Table A.2

Notes:

¹ This table is organized as a key with areas falling into the first class that would include them (from top to bottom). The table is designed to be read from top to bottom with upper units mutually exclusive of units lower in the table.

* Subsurface is 12–39 inches (30–100 centimeters).

** Surface is 0–12 inches (0–30 centimeters).

*** A C4 plant fixes carbon dioxide into a molecule containing four carbon atoms before initiating the Calvin-Benson cycle of photosynthesis.

**** Upland refers to areas that receive no extra moisture beyond ambient precipitation.

The 32 ecological site groups have a naming convention using soil geomorphic units with their respective climate zones derived from an aridity index and maximum temperature of the hottest month (Nauman et al. 2022). The “Arid Warm” climate zone was defined as having an aridity index of less than 0.144 and a maximum temperature of the warmest month greater than 77.04°F (25.02°C). The “Semiarid Warm” climate zone has an aridity index greater than 0.144 and a maximum temperature of the warmest month greater than 77.04°F (25.02°C). The third zone, which was labeled as “Semiarid Cool,” has an aridity index greater than 0.144 and a maximum temperature of the warmest month less than 77.04°F (25.02°C; Nauman et al. 2022).

Ecological site groups can be analyzed in different ways to inform land managers of certain expected and potential resource conditions (for example, the mean reference production for forbs, grasses, shrubs, and trees within all mapped ecological site groups throughout GSENM; see **Table 3-14**). The data presentation in **Table 3-14** is adapted from Table 4 in Nauman et al. 2022.

Table 3-14. GSENM Ecological Site Group Mean Reference Production (pounds per acre) of Plant Functional Groups

Ecological Site Group	Forb	Grass	Shrub	Tree	Total Production
Arid Warm Sandy Uplands and Loamy Uplands	29	228	109	7	372
Arid Warm Shallow	16	110	130	20	275
Arid Warm Very Shallow	20	64	118	56	258
Semiarid Warm Shallow Deep Rocky	29	200	106	83	418
Semiarid Warm Very Shallow	37	79	165	45	328
Arid Warm Breaks	20	42	101	6	168
Outcrops	—	—	—	—	—
Semiarid Warm Finer Uplands	50	315	143	31	539
Arid Warm Deep Rocky	20	172	128	20	341
Semiarid Warm Breaks	20	127	119	94	359
Arid Warm Finer Uplands and Clay Uplands	33	208	118	0	358
Arid Warm Saline Uplands	20	212	88	1	322
Semiarid Warm Sandy Uplands and Loamy Uplands	45	339	148	53	584
Arid Warm Sandy Bottoms	34	355	138	0	527
Arid Warm Saline Hills	13	123	79	2	218
Arid Warm Saline Bottoms and Bottoms	48	560	154	0	762
Arid Warm Gypsum	20	102	115	3	241
Riparian	—	—	—	—	—
Semiarid Cool Shallow	111	270	159	79	620
Semiarid Warm Saline Hills	17	111	117	0	245
Semiarid Cool Deep Rocky	51	282	139	0	472
Semiarid Warm Saline Uplands	45	242	69	29	385
Semiarid Warm Saline Bottoms	63	887	129	0	1079
Semiarid Warm Sandy Bottoms and Bottoms	66	733	170	0	970
Semiarid Cool Very Shallow	—	—	—	—	—
Semiarid Cool Breaks	—	—	—	—	—
Semiarid Cool Saline, Sandy, Loamy, and Finer Uplands	81	483	137	28	730
Semiarid Warm Clay Uplands	42	379	118	18	557
Semiarid Warm Gypsum	22	130	138	4	294
Semiarid Cool Clay Uplands	45	268	143	0	457
Semiarid Cool Bottoms	202	1236	184	3	1625
Semiarid Cool Sandy Bottoms	—	—	—	—	—

Source: adapted from Nauman et al. 2022

Notes: Dashes indicate there are no reference production values currently available. Values within each column are heat mapped to highlight the highest production (darkest) and lowest production (lightest).

Ecological Context

Cattle remove grasses and forbs but do not typically remove woody species. As a result, areas that are heavily grazed often experience an increase in woody species, such as pinyon pine and juniper. Fire suppression has also influenced the extent of woody species, as described further below. In fact, pinyon-

juniper woodlands have increased substantially in both density and extent throughout the Intermountain West over the past 130 to 150 years, often invading landscapes previously dominated by sagebrush (*Artemisia* spp.) (Tausch et al. 1981; Miller and Wigand 1994).

A statewide inventory of Utah's forests estimated that 66 percent of all pinyon-juniper acres in the state are composed of trees established within the last 150 years (O'Brien 1999). Pinyon-juniper woodland expansion has been well documented in the literature (for example, Miller et al. 2008, Romme et al. 2019, and Miller et al. 2013) and is evidenced throughout GSENM by an analysis of aerial imagery. This has been documented even over the past 35 years.

Using data from the Rangeland Analysis Platform¹³ (Rangeland Analysis Platform 2022), the BLM compared estimated tree cover in the ecological site groups in GSENM using average values between 1986 and 1995 with estimated tree and shrub cover using average values between 2012 and 2022. All ecological site groups in GSENM have experienced an increase in tree cover over the examined period. All ecological site groups, except for the Semiarid Cool Clay Uplands group, but including the six groups having a sagebrush-steppe reference state, show more than a 20 percent increase in tree cover during the period analyzed. Of all the groups with increases of 20 or more percent, 13 have increased tree cover of between 20 and 39 percent, 13 have increased tree cover of between 40 and 59 percent, and the remaining 4 groups (Arid Warm Saline Uplands, Arid Warm Saline Hills, Semiarid Warm Saline Uplands, and Arid Warm Sandy Bottoms) have increased between 67 and 102 percent (Rangeland Analysis Platform 2022).

Reduced fire frequency has also affected the composition of vegetation on the GSENM landscape. Prior to European settlement, periodic fires (both natural and lit by Native Americans) throughout GSENM contributed to maintenance of a healthy balance of vegetation types and prevented woody fuels from accumulating to hazardous levels. After European settlement, and despite passage of the Taylor Grazing Act in 1934 to regulate livestock grazing, the area was likely historically overgrazed by cattle and other forms of domestic livestock. Overgrazing has the potential to reduce fine fuels (grasses and forbs) needed to carry these periodic fires and consequently may have contributed to pinyon-juniper expansion and infilling. Fire suppression in recent history may also have contributed to the current conditions by removing the periodic fire disturbance that is essential to maintain a healthy ecosystem and to keep fuels buildup at safe levels. This has led to vegetation that is departed from that associated with historical fire regimes.

As measured by LANDFIRE vegetation condition classes (VCCs; LANDFIRE 2022), which indicate the general level to which current vegetation is different from the estimated historical vegetation conditions, 60 percent of GSENM is moderately or highly departed from historical fire regimes. Fuels loading as a result of fire suppression has increased the susceptibility of vegetation and other resources to large-scale, catastrophic fires. This issue is compounded by the impracticality of prescribed fire as a tool in many situations (see **Section 3.13**, Fire and Fuels Management, for a more detailed description of LANDFIRE VCC and fire management in GSENM).

¹³ The Rangeland Analysis Platform is a remote-sensing data set that uses Landsat imagery to estimate the percent cover of coarse functional groups (annual forbs and grasses, perennial forbs and grasses, shrubs, and trees) annually. Variation is seen in the year-to-year estimates; therefore, for this analysis, the BLM used average values over a 10-year period.

Such catastrophic fires increase the potential for the establishment and spread of noxious weeds and invasive, nonnative plants, particularly cheatgrass (*Bromus tectorum*). When areas burn with uncharacteristic severity, native vegetation is destroyed, leaving burned areas susceptible to cheatgrass invasion if seeds are present in the soil or there is a seed source in proximity. When conditions are favorable for germination, such as after fires, cheatgrass will germinate and can outcompete native vegetation (Zouhar 2003). Grazing has also been linked as a significant cause of increased cheatgrass presence in the Great Basin (Williamson et al. 2020). Fine fuels increase as cheatgrass spreads; since cheatgrass cures earlier than native vegetation, such sites become more susceptible to re-burn. The cheatgrass-fire relationship is, thus, a positive feedback loop for the continued spread of cheatgrass and more frequent fires.

Annual herbaceous cover in GSENM is presented in **Table 3-15** and **Figure 3-16, Appendix A**, based on data from the Rangeland Analysis Platform. In GSENM, annual herbaceous cover is most often invasive annual plant species, notably cheatgrass. The modeling results present evidence of the cover and distribution of invasive annuals across GSENM. Over 55 percent of GSENM has a 1 percent or higher cover of herbaceous annuals; cover greater than 1 percent of invasive annual grasses translates to higher fire frequency. Further, this model may not fully capture the risk for cheatgrass to spread, since cheatgrass seeds can persist in the soil over time (Smith et al. 2008; Zouhar 2003). Additional information is provided in **Section 3.5, Noxious Weeds and Invasive, Nonnative Plants**, regarding other noxious weeds and invasive, nonnative plants.

Table 3-15. Annual Herbaceous Cover in the Planning Area

Percent Cover	Acres ¹	Proportion of Decision Area (%)
0–1	832,100	44.2
1–5	852,800	45.4
5–10	145,700	7.8
10–25	45,800	2.4
>25	4,100	0.2

Source: Rangeland Analysis Platform 2023

¹ Acres rounded to the nearest hundred

Vegetation has been further altered by historical seedings. Across GSENM, there are areas that were treated as rangeland seedings or nonstructural range improvements from the 1960s to around 1980. Such treatments were mostly to increase forage production for livestock grazing. These treatments aimed to improve grass production by removing pinyon-juniper and/or reducing sagebrush densities. These treated lands are often found on sagebrush and grassland sites where there are well-developed and deep soils. These are typically found in valley bottoms, gently sloping terrain, and structural benches, or on mesa tops. A summary of the acres of treatments in GSENM over the past approximately 60 years is included in **Table 3-16**, and these areas are shown on **Figure 3-17 in Appendix A**. Past treatments primarily consisted of seeding and chaining, although several small, prescribed fires, followed by drill seeding, also occurred. Previously treated lands were seeded almost exclusively with nonnative crested wheatgrass (*Agropyron cristatum*) and Russian wild rye (*Psathyrostachys juncea*).

Table 3-16. Past Vegetation Management in the Decision Area¹

Management Action	1960–1980 (acres)	1981–2021 (acres)	Unknown Year² (acres)	Total (acres)
Seeding	13,700	23,500	26,300	63,500
Mechanical treatment	4,700	28,500	—	33,200
Chemical treatment	—	100	2,000	2,100
Prescribed fire	—	1,300	900	2,200
No data ²	12,200	—	9,000	21,200

Source: BLM GIS 2022

¹ Data are not complete, as not all vegetation management methods have been mapped or digitized, particularly those completed prior to the use of GIS technology.

² Some management actions have been mapped, but there are no data regarding what management action was used or the year in which the action was conducted.

Since approximately 1980, the purpose of vegetation management has shifted to improvement of watershed and habitat health. Such restorations have used native or nonnative seeds, or both, depending on management guidance at the time. After 2000, subsequent to the establishment of GSENM and the approval of the 2000 GSENM monument management plan (MMP), restorations were primarily done with native seeds.

Special Status Species

Utah is rich in native flora and is remarkable for its large numbers of endemic and rare plants—attributed to the state’s diverse range of habitats (UDWR 1998, pp. 3–4). Fifty percent of the rare flora in Utah are also found within the GSENM landscape. The area also supports 125 species of plants that occur only in Utah or on the Colorado Plateau (Belnap 1997).

Table 3-17 lists the plants that are federally listed under the ESA of 1973 (16 USC §1531 et seq.) and BLM sensitive plant species managed under BLM Manual 6840, Special Status Species, that have been documented, or that have the potential to occur in GSENM. In summary, there are six plants listed under the ESA and 18 BLM sensitive plants (including the federally listed plants) that have been documented in or that have the potential to occur in GSENM.

Table 3-17. Special Status Species That Occur or Have the Potential to Occur in the Decision Area

Species	Common Name	Federal Status	BLM Status	Known or Potential to Occur	Habitat/ Geology/Soils	Allotments Containing or Likely to Contain	Threats
<i>Asclepias welshii</i>	Welsh's milkweed	Threatened	Sensitive species	Potential	Eolian sand dunes derived from Navajo Sandstone	None	OHV use; hiking; camping; grazing (although no immediate grazing impacts have been observed, even in heavily grazed locations; plant is poisonous to livestock); (NatureServe global status review 10/21/2013)
<i>Carex specuicola</i>	Navajo sedge	Threatened	Sensitive species	Potential	Hanging gardens in Permian Cedar Mesa Sandstone (in Utah); closest population to GSENM boundary is 55 air miles	None	Climate change (G. Rink, 2018 Springs Ecosystem Science: 2018 Symposium; NatureServe Status Review 2023)
<i>Cycladenia humilis</i> var. <i>jonesii</i>	Jones's cycladenia	Threatened	Sensitive species	Known	GSENM occurrences are confined to steep, barren slopes of Triassic Petrified Forest Member of Chinle Formation	King Bench, Deer Creek, Death Hollow, Wagon Box Mesa, Moody	Mineral and oil and gas exploration; OHV damage (NatureServe; global status last reviewed 7/14/2022)
<i>Physaria tumulosa</i>	Kodachrome bladderpod	Endangered	Sensitive species	Known	Confined to GSENM on the Carmel Formation	Deer Spring Point, No Mans Mesa, Upper Paria, Dry Valley, Upper Hackberry	Climate change (NatureServe; global status last reviewed 10/1/2020)
<i>Pediocactus sileri</i> (= <i>Echinocactus</i> s., <i>Utahia</i> s.)	Siler pincushion cactus	Threatened	Sensitive species	Potential	Found on largely barren gypsic soils derived from members of the Moenkopi Formation	None	OHV use; grazing; uranium mining (NatureServe global status last reviewed 9/16/2013)

3. Affected Environment and Environmental Consequences (Vegetation)

Species	Common Name	Federal Status	BLM Status	Known or Potential to Occur	Habitat/ Geology/Soils	Allotments Containing or Likely to Contain	Threats
<i>Spiranthes diluvialis</i>	Ute ladies'-tresses	Threatened	Sensitive species	Known	Found along mesic riparian edges with invariable subirrigation and little or no shading or competition from aggressive rhizomatous grasses	Upper Paria (Henrieville Creek Pasture), King Bench	Invasive species; natural vegetation succession; hydrology change; flooding; road construction; natural herbivory (notably voles); urbanization; loss of pollinators; livestock grazing; haying/mowing (NatureServe global status last reviewed 3/24/2020). The prescription from Boulder Creek, Colorado, is for off-season livestock grazing and off-season mowing to perpetuate this species on irrigated grazing pastures (South Boulder Creek Management Plan, Ch. 7, 1998)
<i>Astragalus ampullarius</i>	Gumbo milkvetch	None	Sensitive species	Known	Heavy clay soils derived primarily from the Chinle Formation, with at least one possible report from the Tropic Shale Formation	Vermillion, Mollies Nipple, Cottonwood, Cockscomb, Coyote,	Possibly mineral exploration and livestock grazing (latest NatureServe global status review 5/1/2003)
<i>Astragalus striatiflorus</i>	Escarpment milkvetch	None	Sensitive species	Known	Interdune valleys, sandy depressions on ledges and sandy stream channel terraces	School Section, Johnson Canyon, Second Point, Cottonwood, Lower Hackberry, Swallow Park, Deer Range	None (latest NatureServe global status review 3/3/1999)

3. Affected Environment and Environmental Consequences (Vegetation)

Species	Common Name	Federal Status	BLM Status	Known or Potential to Occur	Habitat/ Geology/Soils	Allotments Containing or Likely to Contain	Threats
<i>Dalea flavescens</i> var. <i>epica</i>	Hole-in-the-rock prairie-clover	None	Sensitive species	Potential	Sandy tracts in blackbrush and mixed desert shrub areas of Garfield and SW San Juan Counties	Assumed to be found on sandy allotments south and east along Hole-in-the-Rock Road, but no records from GSENM are confirmed by Utah Natural Heritage Program	None; not recognized by NatureServe due to taxonomic issues
<i>Euphorbia nephradenia</i>	Paria spurge	None	Sensitive species	Known	Diverse habitats, from gumbo clay hills to sandy desert washes	Cottonwood, Bunting Well, Upper Warm Creek,	Mining; invasive weeds; off-road recreation; roads
<i>Lupinus caudatus</i> var. <i>cutleri</i>	Cutler's lupine	None	Sensitive species	Known	Grey sand of Kaiparowitz and associated pediment gravels	Headwaters	Threats not well known; taxonomic problems (latest NatureServe global ranking 2/17/2022)
<i>Oenothera murdockii</i>	Chinle evening-primrose	None	Sensitive species	Known	Clay slopes of the Chinle Formation	Mollies Nipple, Vermillion, Flag Point, White Sage, Neaf, Hells Bellows, Cottonwood, Cockscomb	OHV use
<i>Pediomelum epipsilum</i>	Kane breadroot	None	Sensitive species	Known	Moenkopi semi-barrens	White Sage, Vermillion, Mollies Nipple, Cottonwood,	Recreation and possibly livestock trampling (last NatureServe global review 3/12/2019) Vegetation management in Mollies Nipple Allotment favored this long-lived, deep seated perennial by increasing vigor and fecundity, at least in the short term (D. Rooks, personal observation)

3. Affected Environment and Environmental Consequences (Vegetation)

Species	Common Name	Federal Status	BLM Status	Known or Potential to Occur	Habitat/ Geology/Soils	Allotments Containing or Likely to Contain	Threats
<i>Phacelia cronquistiana</i>	Cronquist's phacelia	None	Sensitive species	Potential	Pinyon-juniper-sagebrush and ponderosa pine communities apparently without strong edaphic affinities	Ford Well, Upper Paria, Deer Spring Point, Deer Range	OHV use (last NatureServe global review 1/31/2022); I believe this rare annual would benefit from certain vegetation management where no aggressive species are seeded, and assuming there is not another invasive annual present to immediately fill the open niche (D. Rooks).
<i>Phacelia pulchella</i> var. <i>atwoodii</i>	Atwood's pretty phacelia	None	Sensitive species	Known	Gypsiferous soils derived from the Moenkopi Formation	Headwaters, Rush Beds, Cottonwood, Mollies Nipple, Vermillion, White Sage, Flood Canyon	None (last NatureServe global review 6/30/2008); According to Dr. Welsh, this annual can paint the soil with color on years of favorable precipitation. I suspect it will also benefit from vegetation management where aggressive species are not seeded, similar to Cronquist's phacelia (D. Rooks).
<i>Salvia columbariae</i> var. <i>argillacea</i>	Chinle chia	None	Sensitive species	Known	Clay semi-barrens and "gypsum boils" of the Chinle Formation	Mollies Nipple, Vermillion, Cottonwood	None (last NatureServe review 6/29/2006); accepted as distinct variety by ITIS, according to NatureServe Explorer (accessed 4/5/2023)
<i>Sphaeralcea grossulariifolia</i> var. <i>fumariensis</i>	Smoky Mountain mallow	None	Sensitive species	Known	Variable sandy to clay soils of the Straight Cliff, Tropic Shale and Dakota Formations	Last Chance, Headwaters, Upper Warm Creek, Nipple Bench,	Road disturbance and maintenance (potential threat); (last NatureServe global status review 8/4/2022); Readily colonizes road margins and road cuts, especially Smoky Mountain dugway in favorable years. (D. Rooks, personal observation)
<i>Thelypodopsis ambigua</i> var. <i>erecta</i>	Kanab thelypody	None	Sensitive species	Known	semi-barren clays of the Chinle Formation	White Sage, Vermillion, Mollies Nipple, Cottonwood, Flag Point, Neaf	None; (last NatureServe global status review 11/14/2000)

Sources: BLM 2018; USFWS 2022; SEINet 2022

Trends

Assessment, Inventory, and Monitoring Data Analysis

To summarize what has been detailed in the *Current Conditions* section, there are a number of vegetation AIM parameters that are not meeting expected ecological site group conditions across GSENM. As described in **Section 3.2**, Soil Resources, AIM plots were aggregated by HUC 10 watershed and watershed indicators were considered not meeting expected ecological conditions if more than 25 percent of AIM observations per parameter in each watershed were outside the expected range (**Tables B-1 and B-2, Appendix B**). A raster-based statistical trend analysis (Mann-Kendall) was performed to identify long-term trends in AIM parameters across HUC 10 watersheds that overlap with GSENM. A list of the vegetation parameters with summary of their condition in GSENM is provided below. Full vegetation parameter descriptive statistics are presented in **Appendix B**.

- **Canopy gap cover** – GSENM identified desired conditions as having no canopy gaps greater than 6.56 feet (2 meters). All AIM points within GSENM observed canopy gaps greater than 6.56 feet (2 meters).
- **Tree cover** – There has been a statistically significant increase in tree cover over the last 26 years within GSENM, contributing to hazardous fuels loadings (**Figure 3-18, Appendix A**).
- **Perennial grass cover** – Perennial grass and forb cover is below ecological site group ranges across the entirety of GSENM and has seen a statistically significant decrease (**Figure 3-19, Appendix A**).
- **Annual forb and grass cover** – Annual forb and grass cover within GSENM is increasing in some areas and decreasing in others (**Figure 3-20, Appendix A**). Increasing annual forb/grass cover contributes to hazardous fuels loading and the potential for vegetation conversion.
- **Shrub cover** – Shrub cover is within ecological site group values across most of GSENM. However, statistically significant declines in shrub cover have been observed across GSENM, increasing potential for movement outside of ecological site group values (**Figure 3-21, Appendix A**).

The main drivers that historically affected vegetation in the region, as well as in the planning area, are livestock grazing and changes in fire regimes and climate resulting in vegetation community conversion. This has primarily occurred as pinyon-juniper woodland expansion into sagebrush and other shrub-dominated communities. Community conversion has also occurred because of invasive plant spread, including the invasive annual cheatgrass. Planning area vegetation has also been affected by wildfire, as well as mechanical treatments to improve rangeland conditions. Pinyon-juniper woodlands have expanded over the last century into grassland and shrubland ecosystems throughout the western United States. Livestock grazing, changes in fire regimes, and climate changes drive pinyon-juniper woodland distribution. In the absence of fire (for example, due to fire suppression), pinyon-juniper woodlands have expanded and infilled into sagebrush habitats, leading to increased fuels loading and a greater potential for severe wildfire. Additionally, when pinyon-juniper woodlands expand into sagebrush-steppe habitats, they outcompete understory species for light, moisture, and nutrients. This cycle eventually results in a nearly complete loss of ecologically valuable understory vegetation species, such as shrubs, grasses, and forbs. The altered condition has interconnected effects on soils, vegetation structure and composition, hydrologic patterns, nutrient and fire cycles, forage production, carbon storage, and plant and wildlife biodiversity. Bare ground tends to increase in tree-invaded sites, leading to soil loss due to wind and water erosion (Connelly et al. 2000; Aldrich et al. 2005; Pierson et al. 2007, 2010; Davies et al. 2011).

As described above, prior to establishment of GSENM, many historical vegetation management actions in GSENM were done to increase the value of rangeland for livestock grazing. As such, management actions typically included reducing sagebrush, pinyon-juniper, and other shrub cover and increasing the cover of perennial grasses, typically crested wheatgrass and other valuable livestock forage species. In the intervening decades since such actions were taken, many of these areas have seen no form of disturbance or maintenance, whether natural or anthropogenic. As sagebrush has reestablished, these areas have become characterized by uniform age classes, with decadent sagebrush, hazardous fuels loadings, and a reduced understory of perennial grasses and forbs.

Where seeding maintenance has occurred in historical rangeland treatments, these areas contain a more diverse age class of sagebrush, have a residual perennial grass and forb understory, and are some of the only areas in GSENM that greater sage-grouse (*Centrocercus urophasianus*) currently use. However, because these areas were originally seeded with nonnative crested wheatgrass, the native grasses and forbs are reduced. Yet, these areas more closely resemble the expected natural dominant vegetation than untreated areas. These sites are generally within LANDFIRE Vegetation Condition Class 2, or moderately departed from normal conditions (see **Section 3.13**, Fire and Fuels Management).

Recent vegetation management actions that have occurred were targeted for fuels reduction and habitat improvement. Similar to the historical seeding maintenance treatments, these areas also contain a more diverse age class of shrubs. However, unlike the historical seeding maintenance treatments, a diversity of native grasses and forbs were used, resulting in conditions that more closely resemble the expected natural dominant vegetation.

Special Status Species

Little information is available documenting the current trends, habitat conditions, and population size of most special status plant populations throughout Utah, including BLM sensitive plants (BLM 2018). A range of threats, including habitat degradation from improper livestock grazing, trampling, unauthorized or cross-country OHV use, weed spread, and pinyon-juniper expansion, may affect individual species in different ways. However, the threat of climate change and its associated drought, wildfire, and herbivory effects may be the most significant threat faced by special status plant species in the planning area. Little information is available documenting the current trends, habitat conditions, and population size of most special status plant populations throughout Utah, including BLM sensitive plants (BLM 2018).

Forecasts

Warming temperatures, drought, fire, and other extreme weather effects are expected to increase in frequency and will likely contribute to impacts on terrestrial vegetation and special status plants as climate change continues. The Colorado Plateau Rapid Ecoregional Assessment suggests that the ecoregion is expected to undergo general warming, with as much as a 3.6°F (2°C) increase by 2060 in some locations, particularly in the southern portion of the ecoregion (Bryce et al. 2012, p. 130). Average summer temperatures are expected to increase, but even greater increases are expected for the winter (Bryce et al. 2012, p. 130).

Vegetation communities expected to have the greatest exposure (that is, a higher probability for change) to climate change are shrublands, especially big sagebrush (*Artemisia tridentata*) and blackbrush (*Coleogyne ramosissima*)-Mormon tea (*Ephedra viridis*) communities; riparian vegetation; and pinyon-juniper woodland (Bryce et al. 2012, p. 155). Insects and disease will play a collateral role with the effects of climate change

in altering the dominance and distribution of various vegetation species (Bryce et al. 2012, p. 155); in turn, this will alter the distribution and availability of habitat for special status species.

Temperature increases are expected to interact with water limitations to alter the vegetation community composition and distribution. In many vegetation communities, the canopy cover of perennial plants has shown to be sensitive to temperature, whereas canopy cover of annual plants responds to cool-season precipitation (Munson et al. 2011, p. 1). Climate model projections of precipitation for Utah, including winter precipitation, are not consistent. However, projected rising temperatures will result in a higher snow line (average lowest elevation at which snow falls). Continuing recent trends, this will increase the likelihood that precipitation will fall as rain instead of snow, reducing water storage in the snowpack, particularly at lower elevations that are currently on the margins of reliable snowpack accumulation (BLM 2022). Colorado Plateau Rapid Ecoregional Assessment models (Bryce et al. 2012) predict increasing temperatures in all seasons, as well as reductions in winter and summer precipitation.

Winter precipitation is critical to perennial native plants and enhances annual productivity for certain species (Bryce et al. 2012, p. 145). If both winter and summer precipitation are reduced, trees, especially pinyon pine, and grasses may be reduced (Bryce et al. 2012, p. 145; Munson et al. 2011, p. 1), while shrubs are likely to expand (Munson et al. 2011, p. 1). For tree species, drought-induced water stress has been linked to bark beetle infestations, leading to die-off (Breshears et al. 2005, p. 15147).

The Colorado Plateau Rapid Ecoregional Assessment predicts the contraction of some of the drier shrublands (sagebrush, in particular), savanna pinyon-juniper, and some evergreen forest by 2060, while grasses are expected to expand in the ecoregion (Bryce et al. 2012, p. 145). Within the planning area, the Rapid Ecoregional Assessment predicts a 26 percent reduction in evergreen tree savanna, such as ponderosa pine (*Pinus ponderosa*), and a 17 percent reduction in evergreen shrub savanna, such as sagebrush and saltbrush. The largest expansions are predicted in grasslands, such as those composed of sandhill muhly (*Muhlenbergia pungens*) and blue grama (*Bouteloua gracilis*), with up to a twenty-fold predicted increase. The seasonality and intensity of precipitation will be a key factor in these potential changes. If the trend is toward wetter winters or springs, the invasive grasses, such as cheatgrass, will spread and burn in the summer and fall, reinforcing their persistence over larger areas. If multiple wet years occur, grasses may have the advantage over shrubs in establishment and survival (Bryce et al. 2012, p. 145).

3.3.2 Environmental Consequences

Refer to **Section F.8**, Vegetation, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would existing and proposed land use allocations and discretionary uses affect terrestrial vegetation, including special status plant species?
- How would vegetation management and restoration approaches affect landscape-scale ecological functioning, terrestrial vegetation, and special status plant species?

Impacts Common to All Alternatives

Livestock grazing and trampling can reduce terrestrial vegetation productivity by causing soil compaction or erosion and damaging native plants and tree seedlings (Jones et al. 2009; Guenther et al. 2004; Duniway

et al. 2018). Grazing can also reduce ecological resilience by increasing the spread of invasive plants, altering fuels loads, and altering species composition (Bartos et al. 2001; Young 1989).

In some cases, the reduction in fine fuels caused by grazing could lower the fire hazard. However, this fine fuels reduction can also reduce the number or acreage of low-severity surface fires that would have kept stand densities in check. Reduced surface fires can lead to increased tree densities, as has historically been the case with Utah juniper, in turn leading to hazardous fuels accumulations and the potential for uncharacteristically severe fire.

In other vegetation communities, such as in the aspen-conifer community, grazing can exacerbate effects from fire exclusion by increasing the opportunity for conifer encroachment and allowing aspen to succeed to conifers (Bartos et al. 2001).

Grazing, particularly overgrazing, can alter species composition in non-forested vegetation types by increasing the percentage of woody species (Young 1989) and creating disturbance pathways that increase the spread of invasive weeds, such as cheatgrass. Accelerated erosion associated with overgrazing can shift perennial forb and grasslands to less mesic ecotypes.

Livestock grazing has also been identified as a threat to some special status plant species in the planning area, like Kane breadroot. Livestock can trample plants, damaging or killing them.

However, all alternatives include management direction to mitigate the risks of these impacts and to emphasize sustainable, healthy rangelands with respect to grazing practices. The management direction would differ somewhat under each alternative, as would the specific areas made unavailable to livestock grazing (see **Section 3.16**, Livestock Grazing). Management direction under Alternatives B, C, and D would similarly ensure that grazing is managed to meet BLM standards for range land health, in a manner that is consistent with the protection of GSENM objects. Based on this direction, livestock grazing likely has a neutral effect on the potential to achieve terrestrial vegetation desired conditions at the broad scale; however, there is the potential for site-specific negative impacts to occur, especially on aspen and non-forested plant communities, including riparian areas.

Under all alternatives, grazing permit lease holders may voluntarily relinquish their permits per the procedures in Proclamation 10286. In these cases, the BLM would retire the allotment from livestock grazing and not re-allocate forage in the allotment. In such areas, vegetation communities and rare plant habitats would no longer be subject to the effects from livestock grazing as described above. Targeted livestock grazing could still be used on a temporary basis to help achieve range land health standards as needed, which would help maintain the area at, or move the area towards, desired conditions.

Effects on vegetation may result from various forms of recreation use. Development of new trails and facilities, human ignition of unwanted fires, and unauthorized and cross-country OHV use could change terrestrial vegetation indicators. The effects of these activities are the loss or modification of vegetation, including at-risk plants; the spread of noxious or invasive weeds; and compaction of soil. The level and intensity of change to vegetation depends on the scale of recreation. For example, human-caused ignitions could result in small acres being burned or over thousands of forested acres being lost from a high-severity fire, depending on current conditions. New development or expansion of trails, roads, campgrounds, or facilities would result in the permanent loss of vegetation types at the local level, but would likely not result in effects at the landscape-scale. All alternatives would be subject to these effects; however, adverse

effects on vegetation would be most prominent in areas of higher recreation, such as in motorized and more easily accessible areas. Even where limited to existing designated routes, OHV and other forms of motorized recreation can affect adjacent vegetation communities and rare plant habitat. For example, this can occur by depositing fugitive dust on vegetation and, when severe enough, suppressing plant function and pollinator success, spreading noxious weeds or invasive nonnative plants into uninfested habitats, and increasing the potential for human-caused fires ignited on roadsides to burn into adjacent vegetation.

Where recreation is managed using an SRMA or ERMA on BLM-managed lands, impacts from recreation could be concentrated in one area; however, this could prevent impacts from dispersed recreation elsewhere in the GSENM. Further, rules and guidelines in SRMAs and ERMAs would limit or control activities through specialized management tools, such as designated campsites, permits, area closures, and limitations on the number of users, duration of use, and types of events.

Areas identified as avoidance or exclusion for ROWs would reduce the risk of crushing or removing vegetation and the introduction and spread of noxious and invasive weeds and fugitive dust. ROW exclusion areas would offer greater protections for vegetation than avoidance areas because they would completely prohibit surface-disturbing activities. Limiting vehicle use to existing or designated routes would also reduce the amount of vegetation crushed or removed.

Across all alternatives, federally listed species will be protected according to the ESA, which would provide enhanced protection for these species and support their continued existence in GSENM. Additionally, managing habitat for BLM Sensitive species per Manual 6840 would contribute to maintaining special status species habitat and populations, reducing the potential for listing under the ESA. Species occupying habitats that are often disturbed, such as roadsides, like Smoky Mountain globemallow, areas suitable for woodland product harvest, and high recreation use areas, would be vulnerable to removal of suitable habitat as well as direct removal of individuals. Various surface-disturbing activities, including vegetation management, OHV use, and ROW construction, can directly affect habitats for special status plant species. Recreational use, collection of plants, fire, as well as improper livestock grazing could remove or trample vegetation and disturb soil, resulting in adverse impacts on sensitive or at-risk plant species, like Kane breadroot.

Surface-disturbing activities also can indirectly affect special status species by contributing to soil erosion and transporting invasive species into these habitats. The spread of invasive species could adversely affect at-risk plants due to the limited occurrence size and distribution of these rare plants. Surface disturbance also can result in habitat fragmentation, which can isolate populations of special status plant species. Populations of special status plant species typically have a patchy distribution across the landscape; eliminating one or more populations can prevent gene flow among populations if residual populations are too far apart for sufficient cross-pollination. Habitat fragmentation would be a long-term impact on special status plant species. Utilizing management goals and objectives and mitigating project impacts to minimize surface-disturbing and disruptive activities minimizes adverse impacts from surface disturbance across all alternatives.

Manual treatments would selectively cut, clear, remove, or prune vegetation. Manual treatments would directly remove or modify target vegetation, in turn, changing vegetation structural and functional components by reducing percent cover of target species or changing species composition. Manual treatments would occur in areas where mechanical equipment use would be unlikely or unallowed, such as on steep slopes, near sensitive resources, or in wilderness areas.

Manual treatments would have less potential to damage or kill nontarget vegetation than other methods, including mechanical treatments or prescribed fire. This is because workers could avoid nontarget vegetation and because the amount of surface disturbance associated with manual treatments is generally minor and localized. Nontarget vegetation may be damaged or killed by foot or vehicle traffic in the treatment locations, but this effect would be short term and localized.

Manually removing the shrub or pinyon-juniper canopy in treatment areas could release desired perennial grasses and other herbaceous species that are present in the shrub understory (Monsen et al. 2004). Indirectly, this would increase biodiversity by increasing percent cover of understory herbaceous species in the long term.

Manually removing the shrub or pinyon-juniper canopy could also release invasive annual grasses that are present in the understory (Davies et al. 2011b). This would also change vegetation structural and functional components by increasing the percent cover of invasive annual grasses in both the treatment area, and potentially in the adjacent vegetation communities, for one to several seasons. Managing invasive, nonnative plants in accordance with local weed program monitoring protocol would reduce or prevent this impact.

Impacts on special status plant species from manual treatments would be similar to those described above for general vegetation. Because manual treatments allow for selective vegetation removal, impacts would generally be of low intensity with low vegetation and soil disturbance, and would occur only within the direct footprint of the treatment. The likelihood for injury or mortality of undetected special status plant species would be virtually nonexistent on all categories of special status plants due to localized treatment, targeting of individual plants, and ability to control the level of disturbance.

Mechanical treatments would remove vegetation and prepare and sow in areas where manual treatments would be impractical. Similar to manual treatments, existing vegetation in the treatment area would be reduced and the soil surface disturbed during treatments. Removal would be done by use of vehicles with attached implements designed for vegetation management, such as agricultural mowers, masticators, disks and plows, chains and cables, rangeland drills, and harrows and imprinters. The intensity of these effects may be greater, because mechanical treatments would generally result in surface disturbance and vegetation removal over a larger area than manual treatments and the equipment would have direct contact with the soil. The ability to treat a larger area may mean that more vegetation could be moved toward desired conditions than manual treatments.

Similar to manual treatments, reduction of shrub or pinyon-juniper overstory using mechanical treatments could release desired perennial grasses and forbs in the understory (Monsen et al. 2004). Like manual treatments, mechanical treatments may also indirectly temporarily increase the percent cover of invasive annual grasses in the treatment area and potentially in adjacent vegetation communities (Davies et al. 2011b). Both effects may be greater when mechanical treatments are used, since mechanical treatments would generally affect larger contiguous areas. As described for manual treatments, managing invasive, nonnative plants in accordance with local weed program monitoring protocol would reduce temporary release of invasive annual grasses.

The effects from specific mechanical treatment types are described below. This suite of methods includes currently anticipated treatment types. However, other treatment types not yet identified or in common

use would also be acceptable for implementation if they would result in similar or lesser effects on resources, such that the analysis in this EIS would be unaffected.

Tilling and harrowing would effectively remove vegetation in the short term by uprooting and burying it, creating an unvegetated area that would not carry fire. Tilling and harrowing would also create a seedbed suitable for desired species establishment. Relative to other mechanical methods, tilling and harrowing would result in the most disturbance to vegetation in the short term. This method is most suited for situations where complete vegetation removal is desired, and it is generally used in conjunction with other treatments, such as chemical treatments. For example, pre- and/or post-tilling and harrowing chemical treatments would reduce germination of, or treat, nonnative invasive plants or fire-prone vegetation that has germinated in the treatment area. Tilling and harrowing in areas where nonnative invasive plants are present, without follow-up chemical treatment, would increase the potential for long-term increases in nonnative invasive plant cover (Zouhar 2003) both in the treatment area and in adjacent vegetation. Conducting follow-up treatments would help to more quickly move vegetation toward desired conditions in the long term by reducing the potential for increases in nonnative, invasive plant cover. While tilling and harrowing would remove the organic matter both below and above ground in the short term, over the long term, organic matter stored in plants and soils within the decision area would likely increase compared with pre-treatment conditions, which can have implications for climate change through increased carbon sequestration and storage potential (see **Section 3.1.2**, Climate Change (Including Greenhouse Gases)).

Chaining would reduce shrub or pinyon-juniper cover, prepare the seedbed, and cover broadcast seed in the treatment area. Like tilling and harrowing, chaining would also disturb the soil. As described above, pre-treatment and/or follow-up chemical treatments would generally be used to reduce germination of, or treat, nonnative invasive plants or fire-prone vegetation that has germinated. This would help to more quickly move vegetation in the treatment area toward desired conditions in the long term by reducing the potential for increases in nonnative, invasive plant cover. Chaining, similar to tilling and harrowing, would remove organic matter stored primarily in vegetation above ground or previously damaged vegetation (that is, reduced carbon storage) but would likely improve long-term carbon storage potential relative to pre-treatment conditions.

Imprinting and rangeland drill seeding would reduce vegetation cover in the short term by increasing surface disturbance. Rangeland drill seeding would generally result in less impact intensity than imprinting, because imprinting crushes the vegetation, whereas drill seeding is typically used in areas that already lack vegetation (such as post-burn areas). Pre-treatment and/or follow-up chemical treatments would generally be used to reduce germination of, or treat, nonnative invasive plants or fire-prone vegetation that has germinated and to prepare and sow the seedbed for desired species establishment. This would help to more quickly move vegetation toward desired conditions in the long term by reducing the potential for increases in nonnative, invasive plant cover. In these treatment methods, less disturbance to organic matter in soils would occur compared with chaining, tilling, and harrowing.

Mowing would cut herbaceous and woody vegetation above the ground surface. It would reduce fuels loads in the short term, indirectly lowering flame length and reducing rates of fire spread when fire moved into the mowed area. Like other mechanical treatments, mowing could increase the potential for release of both desired perennial grasses and forbs (Monsen et al. 2004), and invasive annual grasses (Davies et al. 2011b), that are present in the shrub or pinyon-juniper understory. However, the amount of surface

disturbance would be reduced compared to tilling, harrowing, or chaining, which may decrease the potential for invasive annual grass release or germination compared to other mechanical treatments. As described above, follow-up chemical treatments would generally be used to reduce germination of, or treat, nonnative invasive plants or fire-prone vegetation that has germinated. This would help to more quickly move vegetation toward desired conditions in the long term by reducing the potential for increases in nonnative, invasive plant cover. Mowing would primarily impact organic matter that is stored in vegetation above the surface and would result in less carbon loss from organic matter in soils compared with tilling, harrowing, and chaining.

Mulching (mastication) would remove woody vegetation from above the ground surface. This method uses a mechanical mulching tool attached to heavy equipment that shreds live trees from the top down and leaves a layer of mulch on the soil surface. The layer of mulch stabilizes soils, limits erosion, and prolongs moisture for seed germination. This method also reduces tree cover and fuel loads, especially where trees are too dense to hand thin. The amount of surface disturbance from this method is limited to the tires/tracks from the heavy equipment, as the masticator does not make contact with the soil, which may decrease the potential for invasive annual grass release or germination compared with other mechanical treatments. As described above, follow-up chemical treatments would generally be used to reduce germination of, or treat, nonnative invasive plants or fire-prone vegetation that has germinated. This would help to more quickly move vegetation toward desired conditions in the long term by reducing the potential for increases in nonnative, invasive plant cover. Similar to mowing, mulching would primarily impact organic matter stored in vegetation above the surface, but would likely retain more carbon in soils than methods such as chaining, harrowing, and tilling. Impacts from specific mechanical treatment methods, as described above for general vegetation, could occur on all undetected special status plant species; special status plants occurring in unique habitats would be avoided. Mechanical treatments that involve broadcast methods would potentially remove undetected special status plant species due to the inability to be selective toward the target vegetation and the heavy machinery that is involved in implementing these treatments (Benton et al. 2016). Plant mortality and seed burial are likely to occur where there is deep soil surface disruption (such as from tilling and seeding/planting). Destruction of special status plant seed banks would be particularly harmful to species with seeds that remain viable in the soil for long periods of time before germinating. Conducting appropriately timed surveys within suitable or potential habitat would limit the chance of individuals and seed banks being undetected and occurring in a treatment area; however, due to the size and continuity of the treated area, surveys may not capture all individuals, particularly annuals that are not visible year-round or even every year.

Revegetation using seeds and seedlings would change the structural and functional components of vegetation in the long term. Revegetation would increase percent cover of desired species in the treatment area. Revegetation would also help to decrease potential invasive annual grass germination by providing competition in the form of desired perennial grasses and forbs and thus reducing available resources and growing space. This would help reduce ecosystem degradation in the long term from the annual grass invasion-wildfire cycle (D'Antonio and Vitousek 1992; Brooks et al. 2004).

To best meet project objectives, revegetation plant selection would be decided at the site level using guidance from BLM Handbook 1740-2. In accordance with the Handbook (BLM 2008, p. 87), the BLM would prioritize native plant material for revegetation. Revegetation objectives can be met using some native species under certain environmental conditions (Rowe and Leger 2010, Larson et al. 2017). Nonnative plants could be used when the natural biological diversity would not be diminished by nonnative

species, when nonnative species could be confined to the treatment areas, when site inventory indicates a site would not support native species reestablishment, and when resource objectives could not be met with native species.

Per BLM Handbook 1740-2 (BLM 2008, p. 87), an additional condition of using nonnative plants is an unavailability of suitable native species. The BLM would follow the National Seed Strategy for Rehabilitation and Restoration (Plant Conservation Alliance 2015), which guides the development, availability, and use of seed needed for timely and effective restoration; however, it is possible that suitable native seed would be unavailable for revegetation.

Various types of seeding treatments would be used in combination with mechanical and other treatments. Short-term effects on existing vegetation from seeding are localized, damaged or destroyed vegetation and surface disturbance from vehicles or machinery, as discussed for mechanical treatments. In the long term, seeding treatments would increase the percent cover of desired vegetation, and help to more quickly move vegetation toward desired conditions.

In some cases, seeded species may spread into adjacent vegetation (McArthur et al. 1990; Gray and Muir 2013), altering the species composition of these areas. The potential for this impact and its intensity would depend on the seeding method proposed (such as drill seeding versus broadcast seeding), the species seeded, and existing vegetation conditions in adjacent areas.

Overall, revegetation would incrementally move plant community structure and function toward desired conditions by increasing community diversity and function, nutrient and hydrologic cycling, and plant vigor. This would promote maintenance of a more competitive plant community and reduce the threat of invasion by invasive plants. Over time, this would reduce available fuels during fire season, aid in restoring natural burn patterns and lengthening fire return intervals, and aid in increasing the resistance and resilience of treated areas.

Impacts on special status plant species from revegetation would be similar to those described for general vegetation above. Short-term impacts from the use of tools to implement revegetation are described under treatment-specific sections and would mainly apply to undetected special status species, seed banks, and pollinators. Movement toward desired vegetation states would increase biological and structural diversity. These changes would reduce threats to special status plant species (including those occurring in areas adjacent to treatment areas), such as potential loss of populations and habitat to wildfire and competition with invasive species, thereby aiding in recovery. They would also improve conditions for pollinators, thereby increasing pollination opportunities for special status plants.

Prescribed fire would be used under specific weather and wind conditions to remove plant biomass. When used in conjunction with other treatments, prescribed fire can help move vegetation toward desired conditions by improving seed bed conditions and facilitating desired vegetation establishment. For example, in areas with high invasive annual grass cover, prescribed fire would reduce the above-ground live plant and residual biomass cover and invasive annual grass seed bank in the short term, reducing competition for revegetation. Removing above-ground biomass can also release existing perennial grasses and forbs by freeing resources for growth (Monsen et al. 2004). In many types of vegetation in GSENM, prescribed fire is not an appropriate treatment until pre-fire mechanical fuels thinning is conducted. See **Section 3.13**, Fire and Fuels Management, for more information on prescribed fire and its effects on vegetation and fuels.

Known occurrences of special status plants would generally be avoided unless the species is fire adapted. Prescribed fires could kill undetected individuals or kill seeds in the upper soil layers. Many species of special status plants occur in unique soils or topography that are easy to identify and avoid. Prescribed fire during the active growth period would be most damaging to undetected special status plant species, but treatments would most likely occur when plants are dormant, thereby reducing potential for damage to live plants.

Chemical treatments can be used to remove target plants, or decrease target plant growth, seed production, and competitiveness, releasing native or desirable species from competitive pressure and aiding in their reestablishment where vegetation modification is desired. Potential impacts on nontarget vegetation include death, reduced productivity, and abnormal growth from unintended contact with chemicals via drift, runoff, wind transport, or accidental spills and direct spraying. The degree of impacts depends on the chemical used and its properties, such as persistence, the application rate, the treatment method, the physical site conditions, and the weather, such as wind or rain, during treatments (BLM 2007, p. 4-47, *Impacts Common to All Treatments*). These effects would generally be limited to the short term during and immediately following treatments, and following standard operating procedures (BLM 2007, Table 2-8) and mitigation measures (BLM 2016, Table 2-5) would prevent impacts or reduce impact intensity.

Chemical treatments would be unlikely to directly affect special status plants due to implementation of standard operating procedures (BLM 2007, Table 2-8) and mitigation measures (BLM 2016, Table 2-5). Potential impacts on undetected special status plants and seed banks would be the same as described above for general vegetation. They would depend on the active ingredient and application method.

Alternative A

Under Alternative A, current management of terrestrial vegetation would continue under the 2020 GSENM Approved RMP and the 2020 KEPA Approved RMP. The condition and trends for vegetation, as summarized in the affected environment (**Section 3.3, Vegetation, Affected Environment**), would be expected to continue along similar trajectories. These include reduced sagebrush community resistance and resilience from increases in invasive annual grasses and pinyon-juniper encroachment. Conversion to cheatgrass and other invasive annual grasses, which increase the presence of fine fuels and threaten sagebrush communities from fire, would likely continue at a similar rate. These changes in wildfire regime have caused degradation and loss of sagebrush habitats and have altered and simplified plant communities, leading to increased homogeneity of landscapes (Balch et al. 2013; West 2000). The increasing risk of uncharacteristic wildfire due to pinyon juniper expansion, decline of sagebrush due to fire suppression and grazing, increasing invasive annual grass cover, decreasing perennial grass cover, and poor canopy structure would continue and lead to further reduced ecological resilience, particularly in the face of climate change and increased drought. Vegetation management projects, where implemented, would help to move vegetation toward desired conditions and reduce these risks.

Individual woodland product removal and rangeland restoration projects would likely still occur under this alternative. Individual projects would generally reduce sagebrush community losses from wildfire and move vegetation communities toward desired conditions by improving plant community diversity, nutrient and hydrologic cycling, and plant vigor. These include reduced sagebrush community resistance and resilience from increases in invasive annual grasses and pinyon-juniper encroachment. Conversion to cheatgrass and other invasive annual grasses, which increase the presence of fine fuels and threaten

sagebrush communities from fire, would likely continue at a similar rate. These changes in wildfire regime have caused degradation and loss of sagebrush habitats and have altered and simplified plant communities, leading to increased homogeneity of landscapes (Balch et al. 2013; West 2000). There would be a continued trend toward conversion of sagebrush communities to one dominated by invasive annual grasses, eventual loss of native plant diversity, and movement away from desired conditions in the analysis area, particularly in areas with lower resistance to invasion and lower resilience from disturbance, such as wildfire.

Under Alternative A, nearly all allotments would be available for livestock grazing. In these areas, vegetation would continue to be impacted by grazing, as described in *Impacts Common to All Alternatives*. Funding from other agencies and/or organizations that provide money directly to livestock grazing permittees to complete habitat-improvement projects has been used to a minor extent to improve conditions on allotments within GSENM. These projects have been primarily focused on decadent brush removal to improve forage for grazing livestock. Because this funding is tied to allotment permittees, and Alternative A has the greatest number of allotments available for livestock grazing, there would be more available funding to mitigate grazing impacts under Alternative A. However, in the past, these types of projects occur infrequently, and these programs have not been often utilized; therefore, analysis of how these programs would impact vegetation across the range of alternatives is difficult to quantify. Additionally, other funding for vegetation project would still occur through other organizations such as Utah’s Watershed Restoration Initiative.

The number of acres of ecological site groups that would be unavailable for livestock grazing under Alternative A is summarized in **Table 3-18**. Vegetation in these areas would be protected from the effects of grazing. The Arid Warm – Shallow (11,400 acres) and Arid Warm – Sandy Uplands, Loamy Uplands (14,300 acres) ecological site groups contain the most acres that would be unavailable for livestock grazing. As described in **Table 3-13**, these ecological site groups are susceptible to annual invasion and woody encroachment; therefore, making them unavailable to livestock grazing would help reduce these issues and would help move vegetation toward desired conditions and increase resiliency.

Table 3-18. Ecological Site Groups Unavailable for Livestock Grazing under Alternative A

Ecological Site Groups	Acres Unavailable for Livestock Grazing (acres (%))
Arid Warm – Shallow	11,400 (4)
Arid Warm – Sandy Uplands, Loamy Uplands	14,300 (4)
Arid Warm – Breaks	2,300 (3)
Arid Warm – Very Shallow	2,300 (1)
Semiarid Warm – Shallow, Deep Rocky	1,700 (1)
Riparian	800 (24)
Semiarid Warm – Breaks	500 (2)
Arid Warm – Deep Rocky	400 (1)
Semiarid Warm – Very Shallow	400 (1)
Outcrops	300 (0)
Arid Warm – Sandy Bottoms	300 (2)
Arid Warm – Finer Uplands, Clay Uplands	200 (1)
Semiarid Warm – Sandy Uplands, Loamy Uplands	100 (0)
Total Acres	35,000 (2)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GSENM.

The number of acres of ecological site groups that would be closed, limited to existing and designated routes, and open to OHV travel is summarized in **Table 3-19**. The BLM would continue to manage OHV travel as limited to existing and designated routes in 1,861,100 acres, or approximately 99 percent of GSENM, so most vegetation communities and special status plant habitats would not be subject to the effects from cross-country OHV use as described in *Impacts Common to All Alternatives*. Small portions of four ecological site groups (primarily Semiarid Warm – Shallow, Deep Rocky, and also Semiarid Warm – Sandy Uplands, Loamy Uplands, Semiarid Warm – Breaks, and Semiarid Warm – Very Shallow) totaling approximately 2,800 acres or less than 1 percent of the decision area, would be closed to OHV travel.

Table 3-19. Ecological Site Groups in Travel Management Areas under Alternative A

Ecological Site Group	Closed to OHV Travel (Acres (%))	OHV Travel Limited to Existing and Designated Routes (Acres (%))	Open to OHV Travel (Acres (%))
Semiarid Warm – Shallow, Deep Rocky	1,900 (1)	250,200 (99)	0 (0)
Semiarid Warm – Sandy Uplands, Loamy Uplands	500 (<1)	187,400 (100)	0 (0)
Semiarid Warm – Breaks	200 (1)	30,700 (99)	0 (0)
Semiarid Warm – Very Shallow	200 (<1)	77,900 (100)	0 (0)
Semiarid Cool – Shallow	0 (0)	3,000 (100)	0 (0)
Semiarid Warm – Saline Uplands	0 (0)	1,700 (100)	0 (0)
Semiarid Warm – Finer Uplands	0 (0)	53,400 (100)	0 (0)
Arid Warm – Saline Hills	0 (0)	11,300 (100)	0 (0)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	0 (0)	500 (100)	0 (0)
Arid Warm – Saline Uplands	0 (0)	21,800 (100)	0 (0)
Arid Warm – Gypsum	0 (0)	4,600 (100)	0 (0)
Arid Warm – Sandy Bottoms	0 (0)	18,100 (100)	0 (0)
Semiarid Warm – Saline Bottoms	0 (0)	1,600 (100)	0 (0)
Arid Warm – Sandy Uplands, Loamy Uplands	0 (0)	377,600 (100)	0 (0)
Arid Warm – Saline Bottoms, Bottoms	0 (0)	6,000 (100)	0 (0)
Arid Warm – Shallow	0 (0)	305,500 (100)	0 (0)
Semiarid Cool – Sandy Bottoms	0 (0)	0 (0)	0 (0)
Arid Warm – Very Shallow	0 (0)	289,100 (100)	0 (0)
Semiarid Cool – Very Shallow	0 (0)	700 (100)	0 (0)
Outcrops	0 (0)	62,800 (100)	0 (0)
Semiarid Warm – Clay Uplands	0 (0)	300 (100)	0 (0)
Riparian	0 (0)	3,400 (100)	0 (0)
Semiarid Warm – Gypsum	0 (0)	200 (100)	0 (0)
Semiarid Cool – Bottoms	0 (0)	0 (0)	0 (0)
Semiarid Warm – Saline Hills	0 (0)	2,400 (100)	0 (0)
Arid Warm – Deep Rocky	0 (0)	47,100 (100)	0 (0)
Semiarid Warm – Sandy Bottoms, Bottoms	0 (0)	5,500 (100)	0 (0)

Ecological Site Group	Closed to OHV Travel (Acres (%¹))	OHV Travel Limited to Existing and Designated Routes (Acres (%¹))	Open to OHV Travel (Acres (%¹))
Arid Warm – Finer Uplands, Clay Uplands	0 (0)	26,100 (100)	0 (0)
Semiarid Cool – Deep Rocky	0 (0)	2,000 (100)	0 (0)
Semiarid Cool – Breaks	0 (0)	600 (100)	0 (0)
Arid Warm – Breaks	0 (0)	70,100 (100)	0 (0)
Semiarid Cool – Clay Uplands	0 (0)	0 (0)	0 (0)
Grand Total	2,800 (<1)	1,861,100 (99)	0 (0)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

The BLM would continue to manage approximately 1,796,800 acres of vegetation as ERMA and 67,500 acres as SRMA (Table 3-20). These designations may concentrate impacts from recreation in these areas, but would also provide protections to vegetation communities by limiting or restricting impacts from recreation and surface-disturbing activities that would move vegetation away from desired conditions and lead to reduced resiliency, as described under *Impacts Common to All Alternatives*.

Table 3-20. Ecological Site Groups in Recreation Management Areas under Alternative A

Ecological Site Groups	ERMA (Acres (%¹))	SRMA (Acres (%¹))
Arid Warm – Sandy Uplands, Loamy Uplands	345,800 (92)	31,800 (8)
Arid Warm – Shallow	297,900 (98)	7,600 (2)
Arid Warm – Very Shallow	276,300 (96)	12,800 (4)
Semiarid Warm – Shallow, Deep Rocky	245,800 (98)	6,300 (2)
Semiarid Warm – Sandy Uplands, Loamy Uplands	185,300 (99)	2,600 (1)
Semiarid Warm – Very Shallow	77,600 (99)	400 (1)
Arid Warm – Breaks	69,700 (99)	400 (1)
Outcrops	62,300 (99)	500 (1)
Semiarid Warm – Finer Uplands	52,400 (98)	1,000 (2)
Arid Warm – Deep Rocky	46,100 (98)	1,000 (2)
Semiarid Warm – Breaks	30,600 (99)	400 (1)
Arid Warm – Finer Uplands, Clay Uplands	25,100 (96)	1,000 (4)
Arid Warm – Saline Uplands	21,600 (99)	200 (1)
Arid Warm – Sandy Bottoms	17,300 (96)	800 (4)
Arid Warm – Saline Hills	11,300 (100)	0 (0)
Arid Warm – Saline Bottoms, Bottoms	5,700 (95)	300 (5)
Semiarid Warm – Sandy Bottoms, Bottoms	5,300 (96)	200 (4)
Arid Warm – Gypsum	4,400 (96)	200 (4)
Riparian	3,200 (94)	200 (6)
Semiarid Cool – Shallow	3,000 (100)	0 (0)
Semiarid Warm – Saline Hills	2,400 (100)	0 (0)
Semiarid Cool – Deep Rocky	2,000 (100)	0 (0)
Semiarid Warm – Saline Uplands	1,700 (100)	0 (0)
Semiarid Warm – Saline Bottoms	1,600 (100)	0 (0)
Semiarid Cool – Very Shallow	700 (100)	0 (0)
Semiarid Cool – Breaks	600 (100)	0 (0)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	500 (100)	0 (0)
Semiarid Warm – Clay Uplands	300 (100)	0 (0)

3. Affected Environment and Environmental Consequences (Vegetation)

Ecological Site Groups	ERMA (Acres (% ¹))	SRMA (Acres (% ¹))
Semiarid Warm – Gypsum	200 (100)	0 (0)
Grand Total	1,796,800 (95)	67,500 (4)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

Approximately 880,900 acres would continue to be in ROW exclusion areas under Alternative A (Table 3-21). These areas would continue to provide enhanced protection to vegetation communities and special status plant species by reducing impacts from surface-disturbing activities that reduce resiliency of vegetation, as described under *Impacts Common to All Alternatives*.

Table 3-21. Ecological Site Groups in Right-of-Way Allocations under Alternative A

Ecological Site Groups	Open to ROW Authorization (Acres (% ¹))	ROW Avoidance Area (Acres (% ¹))	ROW Exclusion Area (Acres (% ¹))
Arid Warm – Sandy Uplands, Loamy Uplands	154,500 (41)	48,500 (13)	168,700 (45)
Arid Warm – Shallow	95,600 (31)	46,000 (15)	163,000 (53)
Arid Warm – Very Shallow	73,400 (25)	58,900 (20)	156,700 (54)
Semiarid Warm – Shallow, Deep Rocky	86,800 (34)	48,100 (19)	113,900 (45)
Semiarid Warm – Sandy Uplands, Loamy Uplands	117,200 (62)	22,800 (12)	42,200 (22)
Semiarid Warm – Very Shallow	11,400 (15)	23,200 (30)	43,500 (56)
Arid Warm – Breaks	2,600 (4)	17,300 (25)	50,200 (72)
Outcrops	10,800 (17)	13,400 (21)	38,600 (61)
Semiarid Warm – Finer Uplands	31,300 (59)	5,500 (10)	14,500 (27)
Arid Warm – Deep Rocky	10,900 (23)	11,700 (25)	24,600 (52)
Semiarid Warm – Breaks	800 (3)	7,400 (24)	22,700 (73)
Arid Warm – Finer Uplands, Clay Uplands	7,800 (30)	9,700 (37)	6,800 (26)
Arid Warm – Saline Uplands	8,900 (41)	4,600 (21)	8,100 (37)
Arid Warm – Sandy Bottoms	5,600 (31)	3,100 (17)	9,400 (52)
Arid Warm – Saline Hills	5,900 (52)	1,600 (14)	3,800 (34)
Arid Warm – Saline Bottoms, Bottoms	1,000 (17)	3,200 (53)	1,100 (18)
Semiarid Warm – Sandy Bottoms, Bottoms	2,300 (42)	900 (16)	1,900 (35)
Arid Warm – Gypsum	1,600 (35)	800 (17)	2,300 (50)
Riparian	200 (6)	600 (18)	2,600 (76)
Semiarid Cool – Shallow	100 (3)	600 (20)	2,200 (73)
Semiarid Warm – Saline Hills	0 (0)	1,500 (63)	900 (38)
Semiarid Cool – Deep Rocky	300 (15)	700 (35)	900 (45)
Semiarid Warm – Saline Uplands	200 (12)	1,100 (65)	400 (24)
Semiarid Warm – Saline Bottoms	200 (13)	700 (44)	700 (44)
Semiarid Cool – Very Shallow	0 (0)	100 (14)	600 (86)
Semiarid Cool – Breaks	0 (0)	100 (17)	500 (83)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	200 (40)	200 (40)	100 (20)
Semiarid Warm – Clay Uplands	100 (33)	0 (0)	200 (67)
Semiarid Warm – Gypsum	100 (50)	100 (50)	100 (50)
Total Acres	629,900 (33)	332,500 (18)	880,900 (47)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

Alternative B

Like Alternative A, vegetation management under Alternative B would focus on large landscape-scale restoration projects using proactive management to increase vegetation community climate resiliency. This would help maintain the extent and function of vegetation communities in the longer term, as climate trends become more pronounced. It would also help move vegetation toward desired conditions by increasing biodiversity and resiliency of native vegetation communities. Because vegetation management often includes some level of vegetation removal and surface disturbance, short-term negative impacts on vegetation and special status species could occur. As described under *Impacts Common to All Alternatives*, the type of impact and intensity would vary based on treatment type.

Additionally, this alternative includes management direction to complete land health assessments and causal factor determinations within the eight departed watersheds across GSENM within 2 years of signing the ROD. Based on the causal factor determinations, and within 5 years of the signing of the ROD, appropriate actions would be taken that would result in significant progress toward fulfillment of the land health standards. This would ensure that vegetation management would be carried out within the departed watersheds and that no large-scale impacts from discretionary uses (such as livestock grazing and recreation) would occur.

Under Alternative B, in addition to the allotments that are unavailable under Alternative A, allotments that do not have a current grazing permit would become unavailable for livestock grazing. The number of acres of ecological site groups that would be unavailable for livestock grazing under Alternative B is summarized in **Table 3-22**. Approximately 111,000 acres of vegetation in these areas would be protected from the effects of grazing, as described in *Impacts Common to All Alternatives*, with the largest number of acres occurring in the Arid Warm – Sandy Uplands, Loamy Uplands (33,900 acres) and Arid Warm – Shallow (26,200 acres) ecological site groups. As described in **Table 3-13**, these ecological site groups are susceptible to annual invasion and woody encroachment; therefore, making them unavailable to livestock grazing would help reduce these issues. This alternative would help move vegetation toward desired conditions and increase resiliency of vegetation and special status species to a greater extent than under Alternative A by making more acres unavailable to grazing and by reducing AUMs by 2,961.

Table 3-22. Ecological Site Groups Unavailable for Livestock Grazing under Alternative B

Ecological Site Groups	Unavailable for Livestock Grazing (Acres (% ¹))
Arid Warm – Sandy Uplands, Loamy Uplands	33,900 (9)
Arid Warm – Shallow	26,200 (9)
Semiarid Warm – Shallow, Deep Rocky	15,900 (6)
Arid Warm – Very Shallow	13,500 (5)
Outcrops	5,100 (8)
Semiarid Warm – Very Shallow	5,100 (7)
Arid Warm – Breaks	4,200 (6)
Semiarid Warm – Breaks	1,500 (5)
Riparian	1,100 (32)
Semiarid Warm – Sandy Uplands, Loamy Uplands	900 (<1)
Arid Warm – Deep Rocky	900 (2)
Semiarid Warm – Finer Uplands	900 (2)
Arid Warm – Sandy Bottoms	400 (2)
Semiarid Warm – Sandy Bottoms, Bottoms	300 (5)

Ecological Site Groups	Unavailable for Livestock Grazing (Acres (% ¹))
Semiarid Cool – Deep Rocky	300 (15)
Arid Warm – Finer Uplands, Clay Uplands	200 (1)
Arid Warm – Gypsum	100 (2)
Arid Warm – Saline Uplands	100 (<1)
Semiarid Cool – Shallow	100 (3)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	100 (20)
Grand Total	111,000 (6)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

As described under Alternative A, reducing the number of allotment permittees under Alternative B would also reduce funding to complete habitat-improvement projects, potentially reducing opportunity to implement range-improvement projects that would help mitigate the impacts of grazing, compared with Alternative A. However, as described for Alternative A, because these types of projects occur infrequently, and other sources of funding would still be available, analysis of effects on vegetation is difficult to quantify.

The number of acres of ecological site groups that would be closed to OHV travel or limited to existing and designated routes under Alternative B is summarized in **Table 3-23**. Approximately 952,700 acres would be closed to OHV travel, and OHV travel would be limited to existing and designated routes in 911,900 acres (**Table 3-23**). Closing additional areas to OHV travel, compared with Alternative A, would provide enhanced protection to vegetation communities and special status species by reducing impacts from surface-disturbing activities, as described under *Impacts Common to All Alternatives*. Closing areas managed as limited under Alternative A would reduce vehicular travel on designated routes and, therefore, limit impacts on vegetation to a greater extent than under Alternative A. This would have the greatest beneficial impact on ecological site groups that are susceptible to erosion and annual invasion (see **Table 3-13**) and have a large proportion of acres within the project area closed to OHV travel, such as the Arid Warm – Breaks (79 percent), Arid Warm – Very Shallow (60 percent), and Semiarid Cool – Very Shallow (86 percent) ecological site groups (**Table 3-23**).

Table 3-23. Ecological Site Groups in Travel Management Areas under Alternative B

Ecological Site Groups	Closed to OHV Travel (Acres (% ¹))	OHV Travel Limited to Existing and Designated Routes (Acres (% ¹))
Arid Warm – Sandy Uplands, Loamy Uplands	182,700 (48)	194,900 (52)
Arid Warm – Shallow	178,400 (58)	127,100 (42)
Arid Warm – Very Shallow	172,300 (60)	116,900 (40)
Semiarid Warm – Shallow, Deep Rocky	119,700 (47)	132,400 (53)
Arid Warm – Breaks	55,600 (79)	14,500 (21)
Semiarid Warm – Very Shallow	46,700 (60)	31,400 (40)
Semiarid Warm – Sandy Uplands, Loamy Uplands	44,500 (24)	143,400 (76)
Outcrops	41,300 (66)	21,600 (34)
Arid Warm – Deep Rocky	26,900 (57)	20,200 (43)
Semiarid Warm – Breaks	23,700 (76)	7,300 (24)
Semiarid Warm – Finer Uplands	15,000 (28)	38,500 (72)

Ecological Site Groups	Closed to OHV Travel (Acres (% ¹))	OHV Travel Limited to Existing and Designated Routes (Acres (% ¹))
Arid Warm – Sandy Bottoms	10,600 (59)	7,500 (41)
Arid Warm – Saline Uplands	8,700 (40)	13,100 (60)
Arid Warm – Finer Uplands, Clay Uplands	7,500 (29)	18,600 (71)
Arid Warm – Saline Hills	4,100 (36)	7,300 (65)
Riparian	2,900 (85)	500 (15)
Arid Warm – Gypsum	2,300 (50)	2,300 (50)
Semiarid Cool – Shallow	2,200 (73)	700 (23)
Semiarid Warm – Sandy Bottoms, Bottoms	1,900 (35)	3,500 (64)
Arid Warm – Saline Bottoms, Bottoms	1,200 (20)	4,800 (80)
Semiarid Warm – Saline Hills	900 (38)	1,400 (58)
Semiarid Cool – Deep Rocky	900 (45)	1,000 (50)
Semiarid Warm – Saline Bottoms	800 (50)	800 (50)
Semiarid Cool – Very Shallow	600 (86)	100 (14)
Semiarid Cool – Breaks	500 (83)	100 (17)
Semiarid Warm – Saline Uplands	400 (24)	1,300 (76)
Semiarid Warm – Clay Uplands	200 (67)	100 (33)
Semiarid Warm – Gypsum	100 (50)	200 (100)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	100 (20)	400 (80)
Grand Total	952,700 (51)	911,900 (48)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

Under Alternative B, approximately 1,769,200 acres of ERMAs and 95,200 acres of SRMAs would overlap ecological site groups (Table 3-24). Impacts on vegetation and special status species from the designation of RMAs under Alternative B would be similar to Alternative A because the acres and management of RMAs are similar across these alternatives.

Table 3-24. Ecological Site Groups in Recreation Management Areas under Alternative B

Ecological Site Groups	ERMA (Acres (% ¹))	SRMA (Acres (% ¹))
Arid Warm – Sandy Uplands, Loamy Uplands	349,400 (93)	28,100 (7)
Arid Warm – Shallow	286,900 (94)	27,900 (7)
Arid Warm – Very Shallow	266,000 (92)	18,500 (6)
Semiarid Warm – Shallow, Deep Rocky	249,200 (99)	23,000 (8)
Semiarid Warm – Sandy Uplands, Loamy Uplands	188,400 (100)	2,600 (1)
Semiarid Warm – Very Shallow	75,700 (97)	700 (0)
Arid Warm – Breaks	65,800 (94)	2,100 (3)
Outcrops	56,600 (90)	4,300 (6)
Semiarid Warm – Finer Uplands	53,400 (100)	6,200 (10)
Arid Warm – Deep Rocky	44,900 (95)	100 (0)
Semiarid Warm – Breaks	30,200 (97)	2,100 (4)
Arid Warm – Finer Uplands, Clay Uplands	25,000 (96)	600 (2)
Arid Warm – Saline Uplands	20,700 (95)	1,200 (5)
Arid Warm – Sandy Bottoms	15,700 (87)	1,100 (5)
Arid Warm – Saline Hills	11,000 (97)	2,500 (14)
Arid Warm – Saline Bottoms, Bottoms	5,500 (92)	300 (3)
Semiarid Warm – Sandy Bottoms, Bottoms	5,400 (98)	600 (10)

Ecological Site Groups	ERMA (Acres (%¹))	SRMA (Acres (%¹))
Arid Warm – Gypsum	3,800 (83)	0 (0)
Riparian	2,700 (79)	800 (17)
Semiarid Cool – Shallow	3,000 (100)	0 (0)
Semiarid Warm – Saline Hills	2,400 (100)	0 (0)
Semiarid Cool – Deep Rocky	2,000 (100)	0 (0)
Semiarid Warm – Saline Uplands	1,700 (100)	0 (0)
Semiarid Warm – Saline Bottoms	1,600 (100)	0 (0)
Semiarid Cool – Very Shallow	700 (100)	0 (0)
Semiarid Cool – Breaks	600 (100)	0 (0)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	500 (100)	0 (0)
Semiarid Warm – Clay Uplands	300 (100)	0 (0)
Semiarid Warm – Gypsum	200 (100)	0 (0)
Grand Total	1,769,200 (94)	95,200 (5)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

The number of acres of ecological site groups that would be in each type of ROW allocation under Alternative B is summarized in **Table 3-25**. The number of acres that would be managed as ROW exclusion areas is similar to the number under Alternative A, so the beneficial impacts on vegetation and special status species from restricting ROW development would be similar to Alternative A. However, the number of acres that would be open to ROW authorization would be greatly reduced under this alternative, compared with Alternative A. This would restrict the potential for ROW development in these areas, which would have the greatest benefit to vegetation within ecological site groups whose proportion of acres open to ROW authorization is significantly reduced under this alternative. For example, 58 percent less of the Semiarid Warm – Sandy Uplands, Loamy Uplands Ecological Site Group and 52 percent less of the Semiarid Warm – Finer Uplands Ecological Site Group would be open to ROW authorization, compared with Alternative A.

Table 3-25. Ecological Site Groups in Right-of-way Allocations under Alternative B

Ecological Site Groups	Open to ROW Authorization (Acres (%¹))	ROW Avoidance Area (Acres (%¹))	ROW Exclusion Area (Acres (%¹))
Arid Warm – Sandy Uplands, Loamy Uplands	17,600 (5)	176,900 (47)	180,300 (48)
Arid Warm – Shallow	9,400 (3)	113,300 (37)	182,100 (60)
Arid Warm – Very Shallow	11,200 (4)	102,900 (36)	175,100 (61)
Semiarid Warm – Shallow, Deep Rocky	14,800 (6)	108,100 (43)	127,000 (50)
Semiarid Warm – Sandy Uplands, Loamy Uplands	7,400 (4)	129,000 (69)	46,900 (25)
Semiarid Warm – Very Shallow	4,200 (5)	25,400 (33)	48,500 (62)
Arid Warm – Breaks	1,600 (2)	11,600 (17)	56,800 (81)
Outcrops	2,200 (3)	19,300 (31)	41,400 (66)
Semiarid Warm – Finer Uplands	4,000 (7)	30,100 (56)	17,800 (33)
Arid Warm – Deep Rocky	1,200 (3)	17,100 (36)	28,700 (61)
Semiarid Warm – Breaks	1,200 (4)	6,300 (20)	23,500 (76)
Arid Warm – Finer Uplands, Clay Uplands	2,700 (10)	15,200 (58)	7,600 (29)
Arid Warm – Saline Uplands	1,500 (7)	10,400 (48)	9,800 (45)
Arid Warm – Sandy Bottoms	1,200 (7)	6,200 (34)	10,700 (59)

Ecological Site Groups	Open to ROW Authorization (Acres (% ¹))	ROW Avoidance Area (Acres (% ¹))	ROW Exclusion Area (Acres (% ¹))
Arid Warm – Saline Hills	500 (4)	5,700 (50)	5,200 (46)
Arid Warm – Saline Bottoms, Bottoms	700 (12)	3,800 (63)	1,200 (20)
Semiarid Warm – Sandy Bottoms, Bottoms	700 (13)	2,500 (45)	2,000 (36)
Arid Warm – Gypsum	300 (7)	1,900 (41)	2,400 (52)
Riparian	300 (9)	400 (12)	2,800 (82)
Semiarid Cool – Shallow	100 (3)	700 (23)	2,200 (73)
Semiarid Warm – Saline Hills	800 (33)	900 (38)	700 (29)
Semiarid Cool – Deep Rocky	200 (10)	700 (35)	1,000 (50)
Semiarid Warm – Saline Uplands	500 (29)	800 (47)	400 (24)
Semiarid Warm – Saline Bottoms	400 (25)	600 (38)	600 (38)
Semiarid Cool – Very Shallow	0 (0)	100 (14)	600 (86)
Semiarid Cool – Breaks	100 (17)	100 (17)	400 (67)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	0 (0)	300 (60)	100 (20)
Semiarid Warm – Clay Uplands	0 (0)	100 (33)	200 (67)
Semiarid Warm – Gypsum	0 (0)	100 (50)	100 (50)
Grand Total	85,000 (5)	790,300 (42)	976,000 (52)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GSENM.

Alternative C

Vegetation management under Alternative C would use an area management approach where the front country, passage, and outback areas would focus on proactive management, while the primitive area would focus on natural processes. Proactive management in the front, passage, and outback areas would help move vegetation toward desired conditions at a faster rate than natural processes. The relative speed and efficacy of movement toward desired conditions would vary depending on the treatment method or combination of treatment methods, as described above in the *Impacts Common to all Alternatives*. Areas where vegetation has been degraded by invasive annual grass expansion, fire suppression, or excessive livestock grazing may not be able to return to its previous state, or desired conditions, without active management (Briske et al. 2006). Therefore, desired conditions for vegetation in the primitive area may not be achievable under this alternative and may lead to less resilient vegetation in these areas.

This alternative also includes the same management direction to complete land health assessments and causal determinations as under Alternative B, which would help reduce large-scale impacts on vegetation across the eight departed watersheds.

The number of acres of ecological site groups that would be unavailable for livestock grazing under Alternative C is summarized in **Table 3-26**. Under Alternative C, in addition to the allotments that are unavailable under Alternative B, allotments that do not have a current grazing permit would become unavailable for livestock grazing. In addition, allotments within Glen Canyon NRA would also be unavailable to reduce conflicts between recreational users and livestock and for riparian and cultural resource protection. However, this reduction in acres is outside of the GSENM boundary, so the impacts from grazing on vegetation and special status plant species within GSENM would be the same as under Alternative B and reduced from Alternative A.

Table 3-26. Ecological Site Groups Unavailable for Livestock Grazing under Alternative C

Ecological Site Groups	Unavailable for Livestock Grazing (Acres (%¹))
Arid Warm – Sandy Uplands, Loamy Uplands	33,900 (9)
Arid Warm – Shallow	26,200 (9)
Semiarid Warm – Shallow, Deep Rocky	15,900 (6)
Arid Warm – Very Shallow	13,500 (5)
Outcrops	5,100 (8)
Semiarid Warm – Very Shallow	5,100 (7)
Arid Warm – Breaks	4,200 (6)
Semiarid Warm – Breaks	1,500 (5)
Riparian	1,100 (32)
Semiarid Warm – Sandy Uplands, Loamy Uplands	900 (<1)
Arid Warm – Deep Rocky	900 (2)
Semiarid Warm – Finer Uplands	900 (2)
Arid Warm – Sandy Bottoms	400 (2)
Semiarid Warm – Sandy Bottoms, Bottoms	300 (5)
Semiarid Cool – Deep Rocky	300 (15)
Arid Warm – Finer Uplands, Clay Uplands	200 (1)
Arid Warm – Gypsum	100 (2)
Arid Warm – Saline Uplands	100 (<1)
Semiarid Cool – Shallow	100 (3)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	100 (20)
Total Acres	111,000 (6)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

As described under Alternative A, reducing the number of allotment permittees under Alternative C would also reduce funding to complete habitat-improvement projects, potentially reducing opportunity to implement range-improvement projects that would help mitigate the impacts of grazing, compared with Alternative A. However, as described for Alternative A, because these types of projects occur infrequently, and other sources of funding would still be available, analysis of effects on vegetation is difficult to quantify.

The number of acres of ecological site groups that would be closed, limited to existing and designated routes, and open to OHV travel under Alternative C is summarized in **Table 3-27**. Approximately 1,209,400 acres and the majority (more than 50 percent) of most ecological site groups in the GSENM would be closed to OHV travel (**Table 3-27**). These areas would provide enhanced protection to vegetation communities and special status species by reducing impacts from surface-disturbing activities, as described under *Impacts Common to All Alternatives*. Closing previously designated limited areas would reduce vehicular travel on designated routes and, therefore, limit impacts on vegetation and special status species that lead to reduced resiliency to a greater extent than under Alternative A.

Table 3-27. Ecological Site Groups in Travel Management Areas under Alternative C

Ecological Site Groups	Closed to OHV Travel (Acres (%¹))	OHV Travel Limited to Existing and Designated Routes (Acres (%¹))
Arid Warm – Very Shallow	231,600 (80)	57,500 (20)
Arid Warm – Shallow	230,300 (75)	75,200 (25)
Arid Warm – Sandy Uplands, Loamy Uplands	226,100 (60)	151,500 (40)
Semiarid Warm – Shallow, Deep Rocky	148,200 (59)	103,900 (41)
Arid Warm – Breaks	67,400 (96)	2,700 (4)
Outcrops	54,700 (87)	8,200 (13)
Semiarid Warm – Very Shallow	53,600 (69)	24,500 (31)
Semiarid Warm – Sandy Uplands, Loamy Uplands	47,800 (25)	140,100 (75)
Arid Warm – Deep Rocky	35,600 (76)	11,500 (24)
Semiarid Warm – Breaks	26,500 (85)	4,400 (14)
Semiarid Warm – Finer Uplands	20,000 (37)	33,400 (62)
Arid Warm – Saline Uplands	16,600 (76)	5,200 (24)
Arid Warm – Sandy Bottoms	13,400 (74)	4,700 (26)
Arid Warm – Saline Hills	9,500 (84)	1,900 (17)
Arid Warm – Finer Uplands, Clay Uplands	9,800 (38)	16,400 (63)
Riparian	3,100 (91)	400 (12)
Arid Warm – Gypsum	2,900 (63)	1,700 (37)
Semiarid Cool – Shallow	2,400 (80)	600 (20)
Semiarid Warm – Sandy Bottoms, Bottoms	2,300 (42)	3,100 (56)
Arid Warm – Saline Bottoms, Bottoms	1,900 (32)	4,100 (68)
Semiarid Cool – Deep Rocky	1,400 (70)	500 (25)
Semiarid Warm – Saline Hills	1,200 (50)	1,200 (50)
Semiarid Warm – Saline Bottoms	900 (56)	700 (44)
Semiarid Cool – Very Shallow	700 (100)	0 (0)
Semiarid Cool – Breaks	500 (83)	100 (17)
Semiarid Warm – Saline Uplands	500 (29)	1,200 (71)
Semiarid Warm – Clay Uplands	200 (67)	100 (33)
Semiarid Warm – Gypsum	100 (50)	100 (50)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	400 (80)	100 (20)
Grand Total	1,209,400 (65)	655,300 (35)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

Under Alternative C, the BLM would manage approximately 486,100 acres of vegetation as ERMA and 417,100 acres as SRMA (Table 3-28). With fewer acres managed as RMA, there would be less restrictions on recreation and higher potential that greater group sizes, less restrictions on camping and campfires, and the development of facilities could lead to an increase in the degradation of vegetation communities, compared with Alternative A. In general, management for the front and passage areas would be less limiting while the outback and primitive areas would have more restrictions. These restrictions in the outback and primitive areas would reduce impacts that recreational activities would have on vegetation and special status species.

Table 3-28. Ecological Site Groups in Recreation Management Areas under Alternative C

Ecological Site Groups	ERMA (Acres (%¹))	SRMA (Acres (%¹))
Arid Warm – Sandy Uplands, Loamy Uplands	121,000 (32)	156,700 (41)
Semiarid Warm – Sandy Uplands, Loamy Uplands	99,300 (53)	38,200 (20)
Arid Warm – Shallow	54,700 (18)	76,600 (25)
Semiarid Warm – Shallow, Deep Rocky	84,900 (34)	31,900 (13)
Arid Warm – Very Shallow	45,100 (16)	55,500 (19)
Semiarid Warm – Finer Uplands	25,200 (47)	800 (1)
Semiarid Warm – Very Shallow	12,100 (15)	13,300 (17)
Outcrops	4,400 (7)	13,200 (21)
Arid Warm – Breaks	4,500 (6)	9,300 (13)
Semiarid Warm – Breaks	8,300 (27)	3,900 (13)
Arid Warm – Finer Uplands, Clay Uplands	10,100 (39)	1,700 (7)
Arid Warm – Deep Rocky	6,300 (13)	3,900 (8)
Arid Warm – Sandy Bottoms	2,100 (12)	5,000 (28)
Arid Warm – Saline Uplands	2,700 (12)	1,900 (9)
Arid Warm – Saline Bottoms, Bottoms	1,900 (32)	800 (13)
Riparian	300 (9)	2,000 (59)
Arid Warm – Gypsum	800 (17)	1,500 (33)
Semiarid Warm – Sandy Bottoms, Bottoms	1,700 (31)	500 (9)
Arid Warm – Saline Hills	700 (6)	400 (4)
Semiarid Warm – Clay Uplands	200 (67)	0 (0)
Semiarid Warm – Gypsum	0 (0)	0 (0)
Semiarid Warm – Saline Uplands	100 (6)	0 (0)
Grand Total	486,100 (26)	417,100 (22)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

The number of acres of ecological site groups that would be in each type of ROW allocation under Alternative C is summarized in **Table 3-29**. The majority of each ecological site group in the GSENM would be in ROW exclusion areas (**Table 3-29**). Compared with Alternative A, this would offer more protection to vegetation and special status species and reduce impacts associated with ROWs, as described under *Impacts Common to All Alternatives*.

Table 3-29. Ecological Site Groups in Right-of-way Allocations under Alternative C

Ecological Site Groups	Open to ROW Authorization (Acres (%¹))	ROW Avoidance Area (Acres (%¹))	ROW Exclusion Area (Acres (%¹))
Arid Warm – Sandy Uplands, Loamy Uplands	1,700 (0)	155,200 (41)	215,200 (57)
Arid Warm – Shallow	600 (0)	76,200 (25)	228,000 (75)
Arid Warm – Very Shallow	2,200 (1)	55,900 (19)	231,000 (80)
Semiarid Warm – Shallow, Deep Rocky	3,400 (1)	104,200 (41)	141,700 (56)
Semiarid Warm – Sandy Uplands, Loamy Uplands	1,600 (1)	131,900 (70)	48,900 (26)
Semiarid Warm – Very Shallow	100 (0)	25,100 (32)	52,900 (68)
Arid Warm – Breaks	100 (0)	2,000 (3)	68,000 (97)
Outcrops	0 (0)	8,100 (13)	54,700 (87)
Semiarid Warm – Finer Uplands	500 (1)	31,900 (60)	19,000 (36)

Ecological Site Groups	Open to ROW Authorization (Acres (% ¹))	ROW Avoidance Area (Acres (% ¹))	ROW Exclusion Area (Acres (% ¹))
Arid Warm – Deep Rocky	100 (0)	11,800 (25)	35,200 (75)
Semiarid Warm – Breaks	0 (0)	4,400 (14)	26,500 (85)
Arid Warm – Finer Uplands, Clay Uplands	200 (1)	14,100 (54)	10,200 (39)
Arid Warm – Saline Uplands	0 (0)	5,700 (26)	15,900 (73)
Arid Warm – Sandy Bottoms	100 (1)	4,200 (23)	13,800 (76)
Arid Warm – Saline Hills	0 (0)	2,000 (18)	9,400 (83)
Arid Warm – Saline Bottoms, Bottoms	200 (3)	3,700 (62)	1,500 (25)
Semiarid Warm – Sandy Bottoms, Bottoms	100 (2)	2,700 (49)	2,400 (44)
Arid Warm – Gypsum	0 (0)	1,500 (33)	3,000 (65)
Riparian	0 (0)	300 (9)	3,100 (91)
Semiarid Cool – Shallow	0 (0)	700 (23)	2,300 (77)
Semiarid Warm – Saline Hills	0 (0)	1,000 (42)	1,300 (54)
Semiarid Cool – Deep Rocky	0 (0)	1,000 (50)	1,000 (50)
Semiarid Warm – Saline Uplands	0 (0)	1,100 (65)	600 (35)
Semiarid Warm – Saline Bottoms	0 (0)	700 (44)	900 (56)
Semiarid Cool – Very Shallow	0 (0)	0 (0)	600 (86)
Semiarid Cool – Breaks	0 (0)	0 (0)	500 (83)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	0 (0)	0 (0)	200 (40)
Semiarid Warm – Clay Uplands	0 (0)	0 (0)	200 (67)
Semiarid Warm – Gypsum	0 (0)	0 (0)	100 (50)
Grand Total	10,900 (1)	646,100 (34)	1,188,100 (63)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

Alternative D

Vegetation management under Alternative D would prioritize natural processes and techniques, compared with active restoration under Alternative A. Such means are largely hands off and would result in less restorative changes in vegetation than Alternatives B and C. Alternative D would also preclude using prescribed fire in many areas because prescribed fire likely cannot be used without mechanical pre-treatments in much of the GSENM. The prioritization of natural processes would likely reduce the number of restoration projects that use active management and would instead rely on passive management. The limiting of active management would reduce the short-term direct impacts those projects would have on vegetation and special status plant species, such as increased trampling and crushing and increased erosion, as described under *Impacts Common to all Alternatives*. However, the reduction in these projects may also adversely impact vegetation communities and special status species in the long term. The reliance on passive management could increase the establishment of noxious and invasive species if certain tools and techniques were not authorized to be used. Studies have shown that in some circumstances, such as after wildfire, using passive restoration can lead to high levels of woody fuels that can result in unnaturally high-intensity fires that can cause more severe damage to vegetation communities, compared with natural fire regimes (Forest Service 2022). Additionally, the reliance on natural processes may lead to restoration projects requiring longer time to achieve desired conditions compared to active management. In some cases, such as in areas that have been degraded by invasive annual grasses, fire suppression, or excessive livestock grazing, desired conditions for vegetation may not be met without active management (Briske et al. 2006).

Restricting revegetation to native plant materials could increase the cover of native species in project areas, increasing plant community diversity, structure, and function. In some situations, however, native species may not compete well in areas with invasive annual grasses (Miller et al. 2015) or nonnative perennial grasses. Revegetation with native plant materials in these areas without pre- and/or post-chemical treatments of invasive annual grasses and nonnative perennial grasses would likely result in the treatment area being reinvaded by these species or would require the use of more invasive mechanical methods, such as tilling, increasing the necessity for multiple treatments and slowing movement toward desired conditions where treatments were done. Vegetation communities without invasive annual grasses as a component of the plant community and buffered from areas where invasive annual grasses occur would be optimal for manual or mechanical planting treatments. Augmentation with native plant material would provide the opportunity to increase plant communities' resistance and resilience by increasing diversity, structure and function, vigor, and overall health.

Alternative D also includes the management direction to complete land health assessments and, if needed, causal factor determinations across GSENM within 10 years of signing the ROD. This would help ensure that land health standards and movement toward vegetation desired conditions are being met to a greater extent than under Alternative A, which includes no such direction.

Under Alternative D, in addition to the allotments that are unavailable under Alternative C, allotments within departed watersheds, per the long-term trends in AIM parameters in HUC 10 watersheds that overlap with GSENM, would be unavailable. This would add approximately 984,800 acres as unavailable for grazing and reduce AUMs by 62,747 (**Table 2-1**). Within the boundaries of GSENM, approximately 876,400 acres and the majority (more than 50 percent) of most ecological site groups would be unavailable to grazing (**Table 3-30**). Compared with Alternative A, this reduction in AUMs and acres available for livestock would reduce the potential for impacts on vegetation and special status species from surface disturbance through improper grazing practices and range improvements. As described under Alternative A, reducing the number of allotment permittees under Alternative D would also reduce funding to complete habitat-improvement projects, potentially reducing opportunity to implement range-improvement projects that would help mitigate the impacts of grazing, compared with Alternative A. However, as described for Alternative A, because these types of projects occur infrequently, and other sources of funding would still be available, analysis of effects on vegetation is difficult to quantify.

Table 3-30. Ecological Site Groups Unavailable for Livestock Grazing under Alternative D

Ecological Site Groups	Unavailable for Livestock Grazing (Acres (% ¹))
Arid Warm – Sandy Uplands, Loamy Uplands	171,000 (45)
Arid Warm – Shallow	144,500 (47)
Arid Warm – Very Shallow	141,600 (49)
Semiarid Warm – Shallow, Deep Rocky	104,500 (41)
Semiarid Warm – Sandy Uplands, Loamy Uplands	90,100 (48)
Semiarid Warm – Very Shallow	47,300 (61)
Outcrops	31,000 (49)
Arid Warm – Breaks	28,000 (40)
Arid Warm – Deep Rocky	26,600 (56)
Semiarid Warm – Finer Uplands	15,500 (29)
Arid Warm – Saline Uplands	14,700 (67)
Arid Warm – Finer Uplands, Clay Uplands	12,800 (49)

Ecological Site Groups	Unavailable for Livestock Grazing (Acres (% ¹))
Semiarid Warm – Breaks	11,000 (35)
Arid Warm – Sandy Bottoms	9,200 (51)
Arid Warm – Saline Hills	7,000 (62)
Arid Warm – Saline Bottoms, Bottoms	4,000 (67)
Semiarid Warm – Sandy Bottoms, Bottoms	2,300 (42)
Semiarid Cool – Shallow	2,400 (80)
Semiarid Warm – Saline Hills	2,300 (96)
Riparian	2,100 (62)
Arid Warm – Gypsum	2,200 (48)
Semiarid Cool – Deep Rocky	1,400 (70)
Semiarid Warm – Saline Uplands	1,600 (94)
Semiarid Warm – Saline Bottoms	1,500 (94)
Semiarid Cool – Very Shallow	600 (86)
Semiarid Cool – Breaks	500 (83)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	200 (40)
Semiarid Warm – Gypsum	200 (100)
Total Acres	876,400 (47)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM .

The number of acres of ecological site groups that would be closed, limited to existing and designated routes, and open to OHV travel under Alternative D is summarized in **Table 3-31**. Approximately 1,638,100 acres and the majority (more than 50 percent) of most ecological site groups in the GSENM would be closed to OHV travel, the most of any alternative (**Table 3-31**). These areas would provide enhanced protection to vegetation communities and special status species by reducing impacts from surface-disturbing activities, as described under *Impacts Common to All Alternatives*. Closing previously designated limited areas would reduce vehicular travel on designated routes and, therefore, limit impacts on vegetation and special status species to a greater extent than under Alternatives A, B, or C.

Table 3-31. Ecological Site Groups in Travel Management Areas under Alternative D

Ecological Site Groups	Closed (Acres (% ¹))	Limited (Acres (% ¹))
Arid Warm – Sandy Uplands, Loamy Uplands	352,700 (93)	25,000 (7)
Arid Warm – Shallow	289,100 (95)	16,400 (5)
Arid Warm – Very Shallow	269,200 (93)	20,000 (7)
Semiarid Warm – Shallow, Deep Rocky	199,700 (79)	52,400 (21)
Semiarid Warm – Sandy Uplands, Loamy Uplands	119,000 (63)	68,900 (37)
Arid Warm – Breaks	67,700 (97)	2,400 (3)
Semiarid Warm – Very Shallow	66,000 (85)	12,000 (15)
Outcrops	59,500 (95)	3,400 (5)
Arid Warm – Deep Rocky	45,700 (97)	1,400 (3)
Semiarid Warm – Finer Uplands	40,000 (75)	13,400 (25)
Semiarid Warm – Breaks	28,100 (91)	2,900 (9)
Arid Warm – Finer Uplands, Clay Uplands	25,400 (97)	800 (3)
Arid Warm – Saline Uplands	20,000 (92)	1,700 (8)
Arid Warm – Sandy Bottoms	16,900 (93)	1,300 (7)
Arid Warm – Saline Hills	10,500 (93)	900 (8)

Ecological Site Groups	Closed (Acres (%¹))	Limited (Acres (%¹))
Arid Warm – Saline Bottoms, Bottoms	5,700 (95)	300 (5)
Semiarid Warm – Sandy Bottoms, Bottoms	4,500 (82)	1,000 (18)
Arid Warm – Gypsum	4,000 (87)	600 (13)
Riparian	3,300 (97)	100 (3)
Semiarid Cool – Shallow	2,800 (93)	200 (7)
Semiarid Warm – Saline Hills	2,000 (83)	400 (17)
Semiarid Cool – Deep Rocky	1,800 (90)	200 (10)
Semiarid Warm – Saline Uplands	1,200 (71)	500 (29)
Semiarid Warm – Saline Bottoms	1,200 (75)	300 (19)
Semiarid Cool – Very Shallow	700 (100)	0 (0)
Semiarid Cool – Breaks	500 (83)	0 (0)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	500 (100)	0 (0)
Semiarid Warm – Gypsum	200 (100)	100 (50)
Semiarid Warm – Clay Uplands	200 (67)	0 (0)
Grand Total	1,638,100 (87)	226,600 (12)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

Under Alternative D, the BLM would manage approximately 251,100 acres of vegetation as ERMAs and 160,600 acres as SRMAs (**Table 3-32**). With fewer restrictions on recreation, there is potential that greater group sizes, less restriction on camping and campfires, and the development of facilities could lead to an increase in the degradation of and reduced resiliency of vegetation communities and impacts on special status plant species, compared with Alternative A.

Table 3-32. Ecological Site Groups in Recreation Management Areas under Alternative D

Ecological Site Groups	ERMA (Acres (%¹))	SRMA (Acres (%¹))
Arid Warm – Sandy Uplands, Loamy Uplands	86,500 (23)	67,600 (18)
Arid Warm – Shallow	44,800 (15)	30,500 (10)
Arid Warm – Very Shallow	25,300 (9)	29,800 (10)
Semiarid Warm – Sandy Uplands, Loamy Uplands	36,600 (19)	1,600 (1)
Semiarid Warm – Shallow, Deep Rocky	27,400 (11)	4,500 (2)
Semiarid Warm – Very Shallow	10,300 (13)	3,000 (4)
Outcrops	5,000 (8)	8,100 (13)
Arid Warm – Breaks	5,100 (7)	4,100 (6)
Arid Warm – Sandy Bottoms	2,200 (12)	2,700 (15)
Semiarid Warm – Breaks	3,100 (10)	800 (3)
Arid Warm – Deep Rocky	1,600 (3)	1,800 (4)
Riparian	1,000 (29)	1,000 (29)
Arid Warm – Saline Uplands	700 (3)	1,000 (5)
Arid Warm – Finer Uplands, Clay Uplands	400 (2)	1,200 (5)
Arid Warm – Gypsum	300 (7)	1,200 (26)
Arid Warm – Saline Bottoms, Bottoms	200 (3)	600 (10)
Semiarid Warm – Finer Uplands	200 (0)	600 (1)
Semiarid Warm – Sandy Bottoms, Bottoms	300 (5)	200 (4)
Arid Warm – Saline Hills	100 (1)	300 (3)
Grand Total	251,100 (13)	160,600 (9)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GESNM.

The number of acres of ecological site groups that would be in each type of ROW allocation under Alternative D is summarized in **Table 3-33**. The majority of each ecological site groups in the GSENM would be in ROW exclusion areas (**Table 3-33**). Compared with Alternative A, this would offer more protection to vegetation and special status species and reduce impacts associated with ROWs, as described under *Impacts Common to All Alternatives*.

Table 3-33. Ecological Site Groups in Right-of-way Allocations under Alternative D

Ecological Site Groups	Open to ROW Authorization (Acres (% ¹))	ROW Avoidance Area (Acres (% ¹))	ROW Exclusion Area (Acres (% ¹))
Arid Warm – Sandy Uplands, Loamy Uplands	700 (<1)	17,700 (5)	353,700 (94)
Arid Warm – Shallow	100 (<1)	9,000 (3)	295,600 (97)
Arid Warm – Very Shallow	100 (<1)	10,900 (4)	278,100 (96)
Semiarid Warm – Shallow, Deep Rocky	400 (<1)	35,900 (14)	213,000 (84)
Semiarid Warm – Sandy Uplands, Loamy Uplands	300 (<1)	55,800 (30)	126,400 (67)
Semiarid Warm – Very Shallow	0 (0)	4,800 (6)	73,300 (94)
Arid Warm – Breaks	0 (0)	300 (0)	69,800 (100)
Outcrops	0 (0)	700 (1)	62,100 (99)
Semiarid Warm – Finer Uplands	200 (<1)	9,700 (18)	41,600 (78)
Arid Warm – Deep Rocky	0 (0)	700 (1)	46,400 (99)
Semiarid Warm – Breaks	0 (0)	1,500 (5)	29,400 (95)
Arid Warm – Finer Uplands, Clay Uplands	200 (1)	100 (<1)	24,100 (92)
Arid Warm – Saline Uplands	0 (0)	700 (3)	21,000 (96)
Arid Warm – Sandy Bottoms	0 (0)	400 (2)	17,600 (97)
Arid Warm – Saline Hills	0 (0)	300 (3)	11,000 (97)
Arid Warm – Saline Bottoms, Bottoms	200 (3)	100 (2)	5,200 (87)
Semiarid Warm – Sandy Bottoms, Bottoms	100 (2)	700 (13)	4,400 (80)
Arid Warm – Gypsum	0 (0)	300 (7)	4,300 (93)
Riparian	0 (0)	100 (3)	3,400 (100)
Semiarid Cool – Shallow	0 (0)	0 (0)	3,000 (100)
Semiarid Warm – Saline Hills	0 (0)	0 (0)	2,400 (100)
Semiarid Cool – Deep Rocky	0 (0)	0 (0)	2,000 (100)
Semiarid Warm – Saline Uplands	0 (0)	100 (6)	1,600 (94)
Semiarid Warm – Saline Bottoms	0 (0)	100 (6)	1,400 (88)
Semiarid Cool – Very Shallow	0 (0)	0 (0)	700 (100)
Semiarid Cool – Breaks	0 (0)	0 (0)	600 (100)
Semiarid Cool – Saline Uplands, Sandy Uplands, Loamy Uplands, Finer Uplands	0 (0)	0 (0)	500 (100)
Semiarid Warm – Clay Uplands	0 (0)	0 (0)	200 (67)
Semiarid Warm – Gypsum	0 (0)	0 (0)	200 (100)
Total Acres	2,300 (<1)	150,000 (8)	1,692,800 (90)

Source: BLM GIS 2022

¹Percent of total Ecological Site Group acreage in GSENM.

Cumulative Impacts

The BLM, Forest Service, NPS, and state, tribal, county, and privately owned land adjacent to GSENM are considered the cumulative effects analysis area for vegetation. Ongoing and planned actions in and near GSENM would influence vegetation conditions and management effectiveness on a regional scale. The timeframe for cumulative environmental consequences for future actions is 20 years, or the life of the plan.

Portions of GSENM adjoin other BLM-managed lands, National Forest System lands, national parks, and national recreation areas, each with its own land management plan guiding vegetation and fuels management in the administrative area. Vegetation management, including fire and fuels management, is becoming more broadly consistent across federal land ownerships due to updated plan adherence with current federal law, regulation, and policy. Direction for vegetation management in the adjacent agency land management plans are complementary to the proposed plan components for GSENM. This means broad movement toward desired conditions for vegetation condition would be facilitated across administrative boundaries in this region.

The cumulative impacts of past and present actions on vegetation in the planning area are captured in the description of the affected environment (see **Section 3.3, Vegetation, Affected Environment**). Primarily, this includes frequent pre-European settlement lower-intensity fire, followed by post-European settlement livestock grazing and fire suppression, including policies established in the early 1900s and carried forward in other forest and land management plans and other state and local policies throughout the broader landscape, which have resulted in current vegetation conditions that are departed from historical conditions. This has resulted in a landscape with increased pinyon-juniper densities and invasive annual grasses and a greater potential for uncharacteristically large, severe fires compared with historical conditions. Ongoing climate trends, including more frequent extreme fire weather, combine with and exacerbate these conditions.

The importance of vegetation management, including fuels treatments, wildland fire management, and managing for wildlife habitat, is widely recognized by state and federal agencies, adjacent landowners, and the general public. Actions taken outside GSENM include federal and state-funded hazardous fuels reduction projects on Forest Service and BLM-managed lands, which generally aim to move vegetation conditions and fuels loading toward historical conditions and restore historical fire regime groups. The KFO Noxious and Invasive Vegetation Management Environmental Assessment would continue to guide weed management on lands bordering GSENM and would, therefore, have the potential to reduce weeds coming onto GSENM. Other vegetation management projects in the cumulative effects analysis area include the Upper Kanab Creek Watershed Environmental Assessment and the Color Country vegetation management Environmental Assessment. There are also additional renewable energy and other ROW projects in the cumulative effects analysis area, including industrial-scale solar energy development on State of Utah School and Institutional Trust Lands Administration lands near Big Water. Other relevant activities include recreational activities, such as camping/campfire use or OHV use, which increase the potential for human-caused fires that can burn into GSENM, and continued livestock grazing that could affect the condition of vegetation within the cumulative effects analysis area.

Also, nonfederal land management policies are likely to continue affecting vegetation management around GSENM. The cumulative effects across the large, geographically complex, and diverse cumulative analysis area are difficult to analyze, considering the uncertainties associated with government and private actions, and ongoing changes to the region's economy. However, based on the trends identified in this section, cumulative effects, including increases in recreation, continued establishment and spread of weeds, continued encroachment of pinyon and juniper into sagebrush communities, ongoing livestock grazing, and continued housing and commercial development, are likely to continue or increase.

Reasonably foreseeable future actions in GSENM have the potential to impact vegetation; these are generally projects that would substantially alter fuels loading or projects for which there is a risk of human-

caused fire. Projects that are anticipated to alter vegetation conditions include the Skutumpah Terrace Greater Sage-grouse Habitat Restoration Projects, and post-fire restoration projects. Projects that may increase the potential for impacts on vegetation, including removal and increased invasive weed spread, are ROW development projects, including the Newer Garkane Transmission ROW (Buckskin to Fredonia Powerline), the Garkane Transmission ROW, and Lake Powell Pipeline ROW.

Proposed vegetation management activities under the alternatives would contribute to the cumulative effects of regional vegetation management by other agencies and stakeholders. These efforts would contribute to landscape restoration and ecological resilience on a larger scale, with a focus on achieving desired vegetation conditions, restoring more natural fire regimes, and reducing the potential for uncharacteristically large and severe fires. The alternatives that prioritize active vegetation and fuels management with a full range of treatment options, including Alternatives A and B, could have greater contributions toward these effects than Alternative D, which emphasizes passive management and more limited treatment options.

3.3.3 References

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3.4 WATER RESOURCES

3.4.1 Affected Environment

Surface Water Sources

Although water shaped much of the terrain of the planning area, there are limited sources of surface water under present-day conditions. Surface water in this region flows to the Colorado River (above or below Glen Canyon Dam). The planning area crosses five level 4 (HUC 8) subbasins and 25 level 5 (HUC 10) watersheds¹⁴ (**Figure 3-22** in **Appendix A**). The HUC 8 subbasins and acreages within the planning area include the Kanab Creek Subbasin (HUC 1501003; 111,600 acres), the Paria River Subbasin (HUC 14070007; 492,300 acres), the Lower Lake Powell Subbasin (HUC 14070006; 593,100 acres), the Escalante River Subbasin (HUC 14070005; 664,500 acres), and the Upper Lake Powell Subbasin (HUC 14070001; 4,000 acres). The HUC 10 watersheds and associated acreages are listed in **Table 3-34**.

¹⁴ A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream, or similar surface waters. HUC is the acronym for hydrologic unit code. Every hydrologic unit is identified by a unique HUC consisting of 2 to 12 digits based on the levels of classification in the hydrologic unit system. HUC 8, or subbasins, are analogous to a level 4 watershed, and HUC 10, or watershed, are analogous to a level 5 watershed.

Table 3-34. GSENM Hydrologic Unit Code 10 Watersheds

Watershed Name	HUC 10 Code	HUC 8 Subbasin	Acres within the Decision Area	Total Acres of the Watershed	Percentage of Watershed in the Decision Area
Headwaters Escalante River	1407000501	Escalante River	12,300	204,100	6
Boulder Creek-Escalante River	1407000502	Escalante River	93,600	233,700	40
Harris Wash	1407000503	Escalante River	131,700	166,000	79
Horse Canyon-Escalante River	1407000504	Escalante River	163,000	194,300	84
Twentymile Wash-Twentyfive Mile Wash	1407000505	Escalante River	132,200	139,300	95
Moody Creek-Escalante River	1407000506	Escalante River	30,200	163,800	18
Fortymile Gulch-Escalante River	1407000507	Escalante River	103,000	194,600	53
Kanab Creek Headwaters	1501000301	Kanab Creek	2,200	124,200	2
White Sage Wash	1501000302	Kanab Creek	24,800	137,000	18
Upper Johnson Wash	1501000303	Kanab Creek	86,600	183,800	47
Aztec Creek-Lake Powell	1407000601	Lower Lake Powell	31,700	235,300	13
Croton Canyon	1407000602	Lower Lake Powell	121,800	130,400	93
Last Chance Creek	1407000603	Lower Lake Powell	141,600	175,800	81
Warm Creek	1407000605	Lower Lake Powell	97,800	132,900	74
Upper Wahweap Creek	1407000608	Lower Lake Powell	135,800	137,400	99
Lower Wahweap Creek	1407000609	Lower Lake Powell	62,400	152,600	41
West Canyon Creek-Lake Powell	1407000610	Lower Lake Powell	2,000	140,900	1
Upper Paria River	1407000701	Paria River	92,800	169,300	55
Sheep Creek	1407000702	Paria River	42,900	63,100	68
Hackberry Canyon-Cottonwood Creek	1407000703	Paria River	69,300	69,300	100
Upper Buckskin Gulch	1407000704	Paria River	159,400	189,900	84
Lower Buckskin Gulch	1407000705	Paria River	6,300	122,100	5
Middle Paria River	1407000706	Paria River	132,700	143,900	92
Halls Creek	1407000112	Upper Lake Powell	4,000	113,200	4
Sandy Creek-Fremont River	1407000304	Fremont*	200	245,200	<1

Source: BLM GIS 2022

*Sandy Creek – Fremont River HUC 10 crosses into the planning area for less than 1 percent of the total HUC 10 acreage. The subbasin for this watershed is the Fremont HUC 8 Subbasin. However, because the acreage within the planning area is so minimal, the Fremont HUC 8 Subbasin is not discussed in detail in this analysis.

On the planning area’s west side, the Kanab Creek Subbasin (including Johnson Wash and its tributaries) drains into the Grand Canyon. Kanab Creek, Johnson Wash, and Skutumpah Creek are the main perennial sources of water in this subbasin, and are all tributaries to the Colorado River. This subbasin crosses into Arizona and includes several reservoirs that are used for drinking water and irrigation. Kanab Creek and Johnson Wash are both diverted for agricultural uses and are impaired for total dissolved solids (TDS; UDWQ 2022).

The Paria River Subbasin (including Hackberry Creek and Cottonwood Creek) extends from the Bryce Canyon-Bryce Valley area and terminates below Glen Canyon Dam near Lee’s Ferry. The Paria River is perennial from below the town of Cannonville downstream to below the confluence of Cottonwood Creek; then, it becomes intermittent to the Colorado River. The upper reaches of the Paria River are intermittent and are often diverted for irrigation of agricultural lands near the towns of Tropic and Cannonville.

Last Chance Creek and Wahweap Creek within the Lower Lake Powell Subbasin are the primary tributaries off the Kaiparowits Plateau, flowing into the main body of Lake Powell. Wahweap Creek and Last Chance Creek are perennial only along portions of their length. The Escalante River and its tributaries—many of which are perennial—within the Escalante River Subbasin flow from the Aquarius Plateau into the upper portions of Lake Powell. Above the town of Escalante, most of the river’s flow is diverted seasonally to Wide Hollow Reservoir for irrigation of agricultural lands.

Within the planning area, the BLM manages approximately 2,969 square miles of land (BLM 2022). In total, approximately 7,000 miles of streams and washes are within the planning area (BLM GIS 2022). Approximately 97 percent of these are intermittent or ephemeral (National Hydrography Datasets 2023). There are no Federal Emergency Management Agency mapped floodplains in GSENM, which is common in rural areas. Watersheds within the planning area are managed for conservation and activities that have the potential to impact water resources.

Aquatic Assessment, Inventory, and Monitoring

To assess, inventory, and monitor aquatic systems, the BLM has implemented a National Aquatic Monitoring Framework as part of the BLM’s AIM strategy (BLM 2021). This framework provides quantitative data and tools to guide and justify policy action, land uses, and adaptive management decisions. From 2013 through 2022, 57 lotic stream AIM sample events have taken place at 39 unique sites in and adjacent to GSENM; some sites were sampled multiple times.

To assess the conditions of GSENM’s stream miles, the BLM selected a subset of indicators collected that had established benchmark values and that were associated with one of BLM Utah’s land health standards (Kachergis et. al 2020). **Table 3-35** lists these indicators.

Table 3-35. Summary of Assessment, Inventory, and Monitoring (AIM) Indicators Used to Report on Stream Conditions

Land Health Standard ¹	Indicator
2	Percent Fine Sediment
2	Instream Habitat Complexity
2	Bank Cover and Stability
2	Floodplain Connectivity
2 and 3	Vegetative Complexity

Land Health Standard ¹	Indicator
2 and 3	Percent Bank Overhead Cover
3 and 4	Macroinvertebrates
3	Invasive Macroinvertebrate Species
4	pH
4	Specific Conductance
4	Total Nitrogen
4	Total Phosphorous

Source: BLM 2023

¹ Land Health Standard 2 – Riparian and Instream Function; Land Health Standard 3 – Desired Species Indicators; Land Health Standard 4 – Water Quality

Sample sites were selected using both a spatially balanced, randomized survey design, as well as targeted sampled sites. The BLM National Operations Center conducted a weighted analysis of the 28 randomly selected sites that had been sampled between 2013 and 2015. The target population was all perennial streams and rivers occurring within GSENM (BLM 2022). This survey was designed to achieve three objectives (BLM 2023):

1. Determine the condition of GSENM's perennial streams and rivers following the Aquatic Land Health Standards (for example, water quality, geomorphic processes, aquatic biodiversity, and riparian processes)
2. Identify and rank the stressors contributing to degraded conditions, if standards are not attained
3. Prioritize step-down monitoring and adaptive management strategies to identify causal factors and actions to ameliorate degraded conditions.

The BLM originally estimated that the target population of GSENM perennial streams and rivers was 175 miles (BLM 2023). Through sampling efforts, the BLM found that 13 percent of those systems (23 miles) were classified as nonperennial. See **Figure 3-23, Appendix A**, for a map of the 2013–2015 stream and river sites sampled within GSENM.

Since the BLM National Operations Center completed the weighted analysis, the BLM has conducted an additional analysis of reaches with lotic AIM data including additional sites and years, in each HUC 10 watershed. Perennial water is limited in GSENM with 208 miles in 8 out of the 25 HUC 10 watersheds that are in GSENM. Stream and riparian systems, especially those of perennial waters, are among the most important, productive, and diverse ecosystems in GSENM and support a diversity of aquatic species and ecosystem services. The BLM watershed specialists used the benchmark tool developed by the BLM National Operations Center with the established ecoregional benchmarks for Utah. Eight indicators, as listed in **Table 3-36**, were used to describe the physical habitat of the stream and water quality and were used to determine the overall condition of the reach. Similar to the BLM National Operations Center study, indicators were reported as major, moderate, or minimal departure from the historical condition in the benchmark tool.

By assessing the degree of departure of lotic AIM indicators paired with terrestrial AIM indicator data (see **Appendix B** and **Table 3-36**), watersheds containing reaches with high departure from the reference condition (Upper Johnson Wash, White Sage Wash, Middle Paria River, Hackberry Canyon-Cottonwood Creek, Upper Wahweap Creek, Upper Paria River, Boulder Creek-Escalante River, and Horse Canyon-Escalante River) were identified in GSENM. The watersheds identified by both terrestrial and lotic AIM

Table 3-36. Lotic Assessment, Inventory, and Monitoring (AIM) Indicators Evaluated

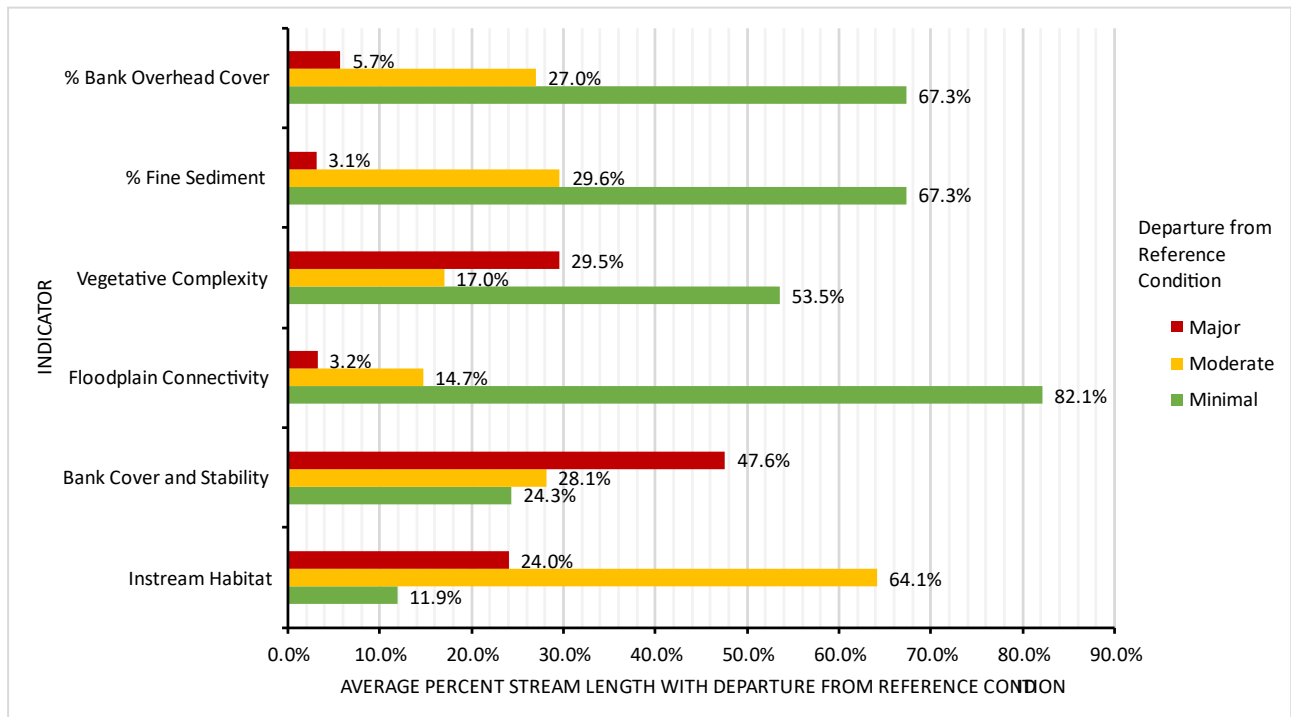
Habitat Indicators	Water Quality Indicators
Percent Overhead Cover	Macroinvertebrate Observed/Expected
Percent Fine Sediment	pH
Percent Banks Covered and Stable	Total Nitrogen and Total Phosphorus
Floodplain Connectivity	Specific Conductance
	Temperature

Source: BLM 2023

analyses are in **Figure 3-24, Appendix A**. Departure scores for the lotic analysis for sites within each HUC 10 watershed were averaged to develop a HUC 10 average reach condition score by watershed. This average reach departure score by HUC should not be interpreted as the condition of all streams in the watershed; instead, it is just of the reaches that have been sampled in the HUC watershed. All values for minimal, moderate, and major departure were based on state standards, BLM technical expertise, and established benchmarks per ecoregion.

From 2013 through 2015, under the BLM’s AIM strategy, data from 28 reaches were analyzed to collectively address each Utah BLM land health standard applicable to stream and river systems. Of the BLM’s 12 indicators surveyed, six are related to stream channel and riparian function (Land Health Standard 2). The six indicators related to riparian function are percent fine sediment, instream habitat complexity, bank cover and stability, floodplain connectivity, vegetative complexity, and percent bank overhead cover (see **Table 3-35**). See **Diagram 3-2** for a data summary of all riparian indicators and the average percent stream length that departed from historical conditions.

Diagram 3-2. Perennial Streams Surveyed in GSENM between 2013 and 2015 with Departure from Historical Condition based on Riparian Indicators



Source: BLM 2023

Of these six indicators, floodplain connectivity, percent fine sediment, and percent bank overhead cover had the most stream length with minimal departure from historical conditions (BLM 2022). Bank cover and stability, and vegetive complexity had the highest percentage of stream length that had major departure from historical conditions (BLM 2022). Although bank overhead cover had a high percentage of stream length with minimal departure from reference, the data show that the cover that is present is low in vegetative complexity, with 30 percent of stream length having major departure from the vegetative complexity historical conditions (BLM 2022).

Flash Floods

Stream channels and other drainage ways in the planning area, are subject to rare but intense short-duration flows during and immediately following up-gradient precipitation events. A flash flood is a rapid rise of water (generally within 6 hours) along a stream or low-lying area after a heavy rainfall or from the failure of a dam, levee, or ice jam. Flash flooding can occur in canyons and washes in the planning area. Flash floods can impact water resources and related infrastructure (such as range improvements). For example, flash floods can damage fences and instream pipelines, and increase the potential for erosion by stripping vegetation and other soil-stabilizing agents from the landscape. Flash floods can also alter drainage patterns and deposit unusually high volumes of sediment or pollutants in channels or floodplains. The longevity of impacts from flash floods varies depending on a variety of factors, including the location, intensity, and duration of the flash flood; the integrity of land surface conditions prior to the flash flood; and the type and location of structures within the flood's path.

Riparian Areas and Wetlands

Riparian vegetation generally occurs next to rivers, creeks, lakes, springs, and wetlands. Riparian areas are a transition zone between upland and aquatic ecosystems. Riparian areas can occur where water is perennial, intermittent, or ephemeral. Riparian areas are defined as a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas.

Wetlands occur in spaces between terrestrial and aquatic systems where the water table is usually at or near the surface or where shallow water covers the land. Soil, water conditions, and vegetation type distinguish wetlands from all other ecosystems. The U.S. Army Corps of Engineers regulates wetlands, which are defined as “those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

Proper Functioning Condition Assessments

Proper functioning condition (PFC) is a qualitative method for assessing the condition of riparian areas and wetlands. The term is used to describe both the assessment process and a defined, on-the-ground condition of a riparian area or wetland. The on-the-ground condition PFC refers to how well the physical processes are functioning. PFC is a state of resilience that allows an area to produce desired values. Riparian areas and wetlands that are not functioning properly cannot sustain these values. PFC is a qualitative assessment performed by an interdisciplinary team. Functioning condition is rated by category to reflect ecosystem health. It is a nationwide goal of the BLM to manage riparian areas for PFC, or make

progress toward PFC. If PFC is not being met, the cause must be determined and changes to management that are preventing the PFC must be implemented (BLM 2001).

The BLM completed riparian PFC assessments in the decision area between 2000 and 2014 (**Figure 3-25** in **Appendix A**). Sixty-six percent of lentic sites (standing water) were in PFC, and an additional 17 percent were functioning at risk, with an upward trend toward PFC. Fourteen percent of lentic sites were functioning at risk, with a downward trend or no apparent trend, and 3 percent were nonfunctional. Of lotic sites (moving water), 74 percent were in PFC, 4 percent were functioning at risk with an upward or static trend, 23 percent were functioning at risk with no apparent or a downward trend, and none were nonfunctional (BLM GIS 2022). Additionally, quantitative data such as the BLM Aquatic AIM data can be used to inform the PFC condition values per watershed.

Water Quality

Every other year, the UDWQ compiles all readily available data and conducts analyses to determine whether the water quality is sufficient to meet the beneficial uses assigned to waters in Utah (UDEQ 2013). Forty-one assessment units that cross into the planning area are protected for the following beneficial uses:

- 1C – Domestic/drinking water source
- 2A – Frequent primary contact recreation (for example, swimming)
- 2B – Infrequent primary contact recreation (for example, wading and fishing)
- 3A – Cold-water fishery/aquatic life
- 3B – Warm-water fishery/aquatic life
- 3C – Nongame fishery/aquatic life
- 4 – Agriculture (crop irrigation and stock watering)

For the 2022 reporting year, 17 of these assessment units were classified as impaired and failing to meet water quality standards. **Table 3-37** identifies the impaired assessment units and their causes of impairment. **Figure 3-26** in **Appendix A** shows riparian areas and the impaired assessment units. Additionally, 20 assessment units had insufficient data to be assessed, 2 supported all designated uses, and 2 supported all designated or assessed uses.

Table 3-37. Utah List of Assessment Units in the Planning Area for Reporting Year 2022

Waterbody Name	Assessment Unit ID	Total Acres	Acres in Planning Area	Assessment Category	Beneficial Use	Cause of Impairment
Birch Creek	UT14070005-002_00	55,926	13	5 – total maximum daily load (TMDL) required	2B, 3A, 4	3A: Temperature
Calf Creek	UT14070005-007_00	34,682,406	8,600	5 – TMDL required	2B, 3A, 4	3A: Temperature
Cottonwood Creek	UT14070007-004_00	275,440,635	68,100	5 – TMDL required	2B, 3C, 4	3C: Dissolved Oxygen
Escalante River Lower	UT14070005-011_00	5,956,733	1,500	5 – TMDL required	2B, 3B, 4	3B: Dissolved Oxygen

3. Affected Environment and Environmental Consequences (Water Resources)

Waterbody Name	Assessment Unit ID	Total Acres	Acres in Planning Area	Assessment Category	Beneficial Use	Cause of Impairment
Escalante River Upper	UT14070005-012_00	8,006,322	2,000	5 – TMDL required	2B, 3B, 4	3B: Benthic Invertebrate Assessment 4: TDS
Halls Creek	UT14070001-001_00	16,182,685	4,000	5 – TMDL required	2B, 3B, 4	3B: Temperature 4: TDS and Boron
Johnson Wash-1	UT15010003-004_00	392,904,908	97,100	5 – TMDL required	2B, 3C, 4	2B: pH 3A: pH, Temperature, Benthic Invertebrate Assessment, Zinc, and Dissolved Oxygen 4: pH and TDS
Johnson Wash-2	UT15010003-005_00	50,014,130	12,400	5 – TMDL required	2B, 3A, 4	4: TDS
Kanab Creek-1-2	UT15010003-002_02	5,842,760	1,400	5 – TMDL required	2B, 3C, 4	4: TDS
Kanab Creek-2	UT15010003-003_00	2,877,497	700	5 – TMDL required	2B, 3C, 4	3C: Selenium 4: Selenium, TDS, and Boron
Last Chance Creek	UT14070006-004_00	571,852,903	141,300	5 – TMDL required	2B, 3B, 4	3B: Benthic invertebrate assessment and dissolved oxygen 4: TDS
Oak Creek	UT14070003-011_00	703,688	200	5 – TMDL required	1C, 2A, 3A, 4	3A: Temperature
Paria River-1	UT14070007-001_00	358,875,668	88,700	5 – TMDL required	2B, 3C, 4	3C: Temperature and benthic invertebrate assessment 4: TDS
Paria River-2	UT14070007-002_00	459,072,591	113,400	5 – TMDL required	2B, 3C, 4	3C: Temperature 4: TDS
Paria River-3	UT14070007-005_00	242,665,997	60,000	5 – TMDL required	2B, 3C, 4	3C: Benthic invertebrate assessment 4: TDS
The Gulch	UT14070005-010_00	156,870,034	38,800	5 – TMDL required	2B, 3B, 4	3B: Benthic invertebrate assessment
Wahweap Creek	UT14070006-001_00	787,047,677	194,500	5 – TMDL required	2B, 3B, 4	3B: Temperature 4: TDS

Source: UDWQ 2022

Note: Although there are impaired waters identified in the watersheds that cross into the planning area, the BLM is only responsible for management of units within the decision area boundary.

Impairments in the planning area are a result of elevated TDS, temperature, and benthic macroinvertebrate assemblages (see **Table 3-37**). In some cases, surface-disturbing activities such as livestock grazing, recreation, natural geologic conditions, and OHV use may contribute to water quality impairment via direct effects, such as those of animal waste on dissolved oxygen or nutrients (nitrogen or phosphorus), or by indirect effects, such as by increasing erosion, which increases sediment loading (turbidity), TDS, and associated metals. Such effects may also impair benthic macroinvertebrate and fish habitat and result in low observed and expected bio-assessment scores.

Water quality management plans were developed for the Escalante River and Paria River watersheds in 2007 and 2004, respectively, to address exceedances of water quality standards in those areas (Millennium Science and Engineering 2007, 2004). In 2002, the Upper Escalante River assessment unit was identified as being impaired due to the exceedance of Utah's temperature criteria for cold-water species of game fish and other aquatic life (beneficial use category 3A). In the 2007 watershed plan created for the Escalante River, temperature exceedances were suggested to be a result of livestock grazing, a lack of riparian habitat, and low instream flows due to diversions for irrigation (Millennium Science and Engineering 2007).

In 2008, the Upper Escalante River assessment unit was listed as impaired for aquatic wildlife (warm-water) beneficial use; this was due to exceedances of the benthic macroinvertebrate bio-assessment criteria. In 2016, the same assessment unit was identified as being impaired for agricultural beneficial uses due to exceedances of TDS numeric criteria. Both of these impairments are still listed for the Upper Escalante River assessment unit as part of the 2022 Utah Integrated Report Assessment (UDWQ 2022).

In 2002, two reaches (Reach 1 and Reach 3) within the Paria River were identified as being impaired due to exceedance of Utah's TDS criteria for protection of agricultural uses (Class 4 waters), including irrigation and stock watering. In 2008, Reach 3 of the Paria River was also listed as impaired for aquatic wildlife use (nongame fish and other) due to benthic macroinvertebrate bio-assessments. In 2014, Reach 2 was listed as impaired for aquatic wildlife use (nongame fish and other) due to exceedances of temperature criteria (UDWQ 2022).

Currently, Reaches 1, 2, and 3 are all still assessed as not meeting criteria to support beneficial uses (UDWQ 2022). As a result of the 2022 UDWQ assessment of impaired waters, all reaches were listed as impaired for agricultural use based on exceedances of TDS. Reaches 1 and 2 were listed as impaired for aquatic wildlife (nongame fish and other) based on temperature exceedances, and Reaches 1 and 3 were listed as impaired for aquatic wildlife (non-fish game and other) based on benthic macroinvertebrate bio-assessments. Additionally, the UDWQ identified all three reaches as target waterbodies for development of TMDLs.

The Paria River Water Quality Management Plan identified that the predominant source of TDS loading in the Paria River is from naturally occurring geological formations prevalent within the watershed, particularly Tropic Shale, as well as saline aquifers (Millennium Science and Engineering 2004). The plan recommended implementing site-specific TDS standards (2,500 milligrams per liter and 1,500 milligrams per liter for Reach 1 and Reach 3, respectively) to reflect the natural background concentrations of TDS in the river. The plan also recommended, to the extent possible, reducing TDS loads by improving irrigation efficiency in the watershed, stabilizing stream channels, and protecting stream banks from erosion (Millennium Science and Engineering 2004). Since the plan was completed, no site-specific TDS standards have been developed for the Paria River; however, there have been multiple projects that concentrate on reducing erosion.

Since 2019, the BLM has been working with a consultant to collect water quality samples across GSENM to support the UDWQ Cooperative Monitoring Program. This sampling includes measurement of discharge, water temperature, pH, specific conductivity, and dissolved oxygen at 12 locations. In 2022, bacteriological sampling and analysis for *Escherichia coli* was completed at four locations (Deer Creek at Burr Trail, Calf Creek above Escalante River, Escalante River above Calf Creek, and Willis Creek at Skutumpah Road crossing). This sampling was conducted monthly, concurrently with water quality sampling. No sites sampled had concentrations above the health advisory threshold for *Escherichia coli* (BLM 2022).

One specific threat to water quality throughout GSENM is riparian invasive woody plants. Invasive woody plants favor riparian areas where the soil is moist. However, over time these invasive plants can crowd out native riparian plants and significantly decrease the diversity of riparian cover (U.S. Department of Agriculture 2022). One invasive woody plant, Russian olive, is particularly problematic in GSENM and was identified as an issue in the 1980s (Scott et al. 2017). This invasive woody species can take over riparian areas, alter the flood regime, and cause channel narrowing (Scott et al. 2017). Russian olive spreads quickly through seeds that are transported by animals, wind, and water (U.S. Department of Agriculture 2020). The major threat to water quality (TDS) by these invasive species is through a change in channel geometry and resulting channel erosion.

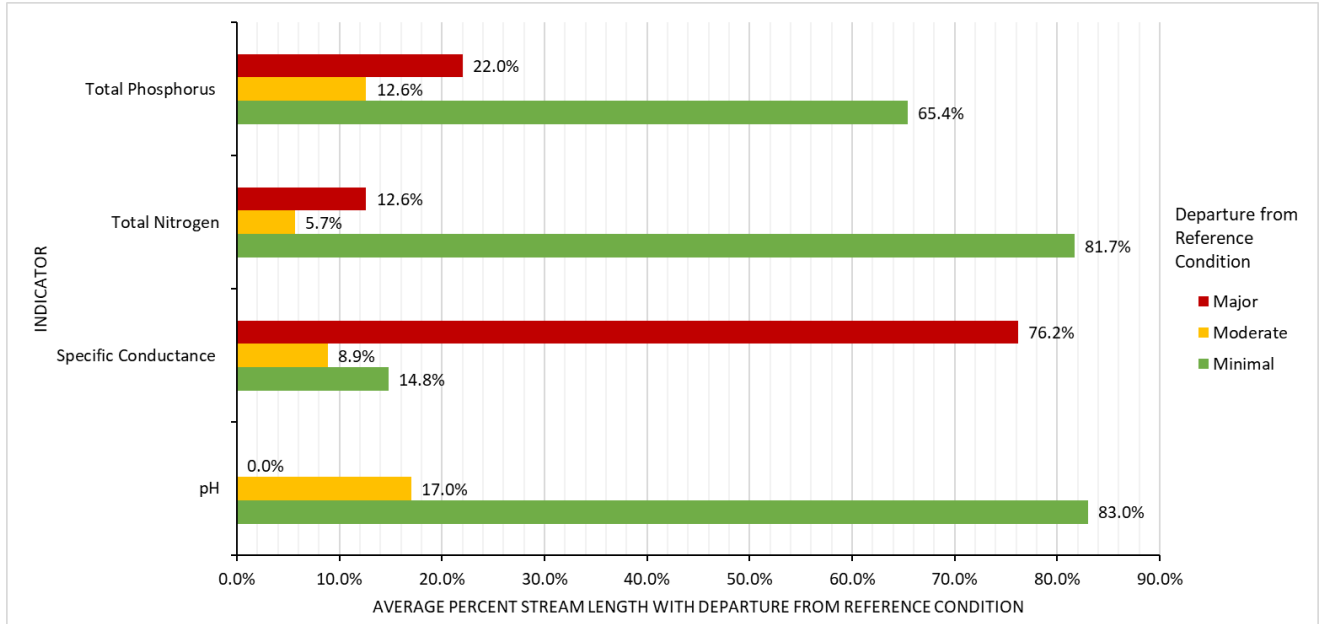
Throughout GSENM, various public organizations and government entities conduct measures to control woody invasive plants. This work, principally on Russian olive and sometimes tamarisk, has been conducted in the Escalante River watershed since 2009. To date, approximately 90 stream miles have been treated within the Escalante River watershed (on the main stem and tributaries). Woody invasive plants were removed in an effort to revegetate the riparian corridor with native species. This provides nonpoint source reduction through both bank stabilization and restoration and enhancement of the riparian community and associated hydrologic, sediment-trapping, and biogeochemical processes (UDEQ 2013).

In 1999, the BLM worked with permittees to gradually reduce the potential effect of livestock grazing on riparian habitats. The BLM closed livestock grazing allotments along the main stem of the Escalante River in the Sand and Death Hollow watersheds. This was done primarily to improve riparian and wildlife habitat and to reduce livestock grazing conflicts. The BLM has implemented projects to restore altered watersheds and improve conditions.

Lotic AIM indicators for water quality conditions consist of pH, specific conductance, total nitrogen, and total phosphorus. Based on the BLM National Operations Center analysis, few streams or rivers in GSENM had pH or total nitrogen results that varied more than minimal departure from historical conditions. Eighty-three percent of streams were characterized as minimal departure from reference pH conditions, and 81.7 percent of streams were characterized as minimal departure from reference nitrogen conditions (**Diagram 3-3**).

Lotic AIM data show that 65.4 percent of streams are in minimal departure from total phosphorus reference values. Of the streams surveyed, 76.2 percent showed major departure from specific conductance reference values, showing that increased specific conductance is one of the most pervasive issues related to water quality throughout the planning area (BLM 2022). The major departure from specific conductance reference values may be correlated to the Paria River's high TDS loadings from local geology and from the saline aquifers feeding into the river.

Diagram 3-3. Average Percent Stream Length Departure from Water Quality Historical Conditions in GSENM



Source: BLM 2023

Groundwater Sources

The Colorado Plateau aquifers underlie the decision area (Robson and Banta 1995). The Colorado Plateau aquifers underlie an area of approximately 110,000 square miles in western Colorado, northwestern New Mexico, northeastern Arizona, and eastern Utah. In general, the aquifers in the Colorado Plateau area are composed of permeable, moderate- to well-consolidated sedimentary rocks. Much of the land in this sparsely populated region is underlain by rocks that contain aquifers capable of yielding usable quantities of water of a quality suitable for most agricultural and domestic uses. The groundwater quantity and quality in the Colorado Plateau aquifers are extremely variable.

Several aquifer systems underlie the decision area. The major aquifer system is within the Navajo Sandstone and underlying sandstones that exist in most parts of the area. This system is part of a regional aquifer system that encompasses parts of Colorado, Arizona, and Utah. This system is now called the Glen Canyon aquifer. This aquifer is recharged partly by precipitation and seepage from creeks and irrigation water that infiltrates the Navajo Sandstone where it outcrops in the northeastern and southwestern parts of GSENM, and partly by snowmelt and rainfall that infiltrate the higher plateaus to the north. It is also recharged partly by the Kaiparowits Plateau where the water must move down through overlying strata before it reaches the Glen Canyon aquifer (Sunrise Engineering 2023). The Glen Canyon aquifer sustains part of the base flow in Johnson Creek, the Paria River, and the Escalante River and its tributaries (Freethey 1997).

Other regional aquifers exist under the decision area. The Kaiparowits Plateau includes the Mesa Verde, Dakota, Morrison, and Entrada-Preuss aquifers that overlie the Glen Canyon aquifer. Carbonate aquifers of the Paleozoic age underlie all of the planning area, but they are largely inaccessible because of the depth. The direction of groundwater movement, estimated from water levels from a few wells and from knowledge about the nature of recharge to aquifers, is from the northwest to the southeast, toward Lake

Powell. From meager data sites, it is thought that locally, groundwater moves toward and discharges into the deepest canyons. The thickness of these regional aquifers ranges from 200 feet for the Dakota aquifer to 2,200 feet for the Glen Canyon aquifer (Freethy 1997).

Springs supply much of the natural water flow within the decision area. They are important for sustaining ecosystem functions within riparian areas during drier periods. In addition, springs and underground wells supply much of the water used for domestic, municipal, irrigation, and livestock watering in the decision area. In 2006, an inventory of springs in GSENM completed by Northern Arizona University found evidence that the higher-elevation benches that extend south into the study area are the primary pathways of groundwater recharge in the region (Rice and Springer 2006). Water quality measurements were taken at seven springs across GSENM. The temperature ranged from 53.4 to 60.6°F (11.9 to 15.9°C), The average pH value across all sites was 7.94, dissolved oxygen ranged from 1.58 to 8.1 milligrams per liter, and TDS ranged from 100 to 530 milligrams per liter (Rice and Springer 2006). They also found that the primary source of recharge to the groundwater in the basin is from winter precipitation in high-elevation areas (Rice and Springer 2006).

In 2013, the BLM coordinated with the U.S. Geological Survey (USGS) to complete an inventory of wells and springs within the planning area in an effort to document potential locations for establishing a groundwater monitoring program. The 2013 inventory included springs and wells within 10 miles of the planning area boundary. In total, 262 springs and 1,450 underground wells (active water rights) were identified in the planning area. Well estimates only included water rights that did not lapse/expire or that were not rejected or terminated.

Since 2013, the BLM worked with the USGS to complete an additional spring survey in an effort to develop a more accurate inventory of springs in the planning area. The inventory included springs and wells, as well as management recommendations at each spring. In total, 436 springs were identified, and over 50 springs were surveyed as part of the 2021 survey. Most of these were influenced by anthropogenic alteration for livestock watering (Spring Stewardship Institute 2021). Suggested management recommendations include removing broken infrastructure or erecting fencing to reduce impacts from livestock (Spring Stewardship Institute 2021).

Water Rights

There are 2,039 total rights within the planning area and 1,379 BLM-managed water rights in the decision area. The vast majority of BLM-managed water rights are point-to-point stock watering rights. There have been no active new uses or large applications in the past 10 years. Water use in the decision area is mostly for agriculture, but there is also some domestic and industrial use to support fire suppression, domestic wells, and oil and gas wells. Five drinking water protection zones and two culinary water service areas are within the decision area (**Figure 3-27** in **Appendix A**). The BLM is aware of the importance of preserving BLM-managed water rights and has a stringent process of reviewing water right applications and protesting applications that have the potential to affect GSENM. Additionally, the BLM plans to continue actively monitoring water right applications and to keep water rights in GSENM active. The BLM plans to acquire and perfect federal reserved water rights necessary to carry out public land management purposes. If a federal reserved water right is not available, then the BLM will acquire and perfect water rights through state law.

New water rights appropriations occur occasionally within the decision area; however, they are limited because water sources are considered by the state engineer to be fully appropriated (Utah Division of Water Rights 2011a, 2011b). Where available, new appropriations are generally limited (cumulatively) to the requirements of one family, 0.25 acres of irrigation, and 10 head of livestock (such as 1.73 acre-feet in total), or an equivalent amount for other uses. Although water uses are relatively static, the use of Wide Hollow Reservoir has increased slightly. Henrieville water use has also increased. Livestock water uses have remained static.

Due to a change in the state water law in 2015 (Senate Bill 274 amendment to Utah Code 73-3-31), the BLM no longer has the authority to apply for new livestock-related water rights throughout the decision area. Any new BLM water uses or locations involving livestock are accomplished via a change in existing water rights. Approvals of other beneficial uses of water are considered on a case-by-case basis in limited areas.

Water Quantity

Precipitation

Average precipitation in the planning area is varied based on the elevation. In the past 10 years, the BLM has installed a network of weather stations in the planning area to collect more accurate data to use for long-term trend assessment and drought modeling.

The average annual precipitation for the planning area is between 6 and 24 inches, with areas closer to Lake Powell receiving closer to 6 inches and areas north and northeast of Kanab receiving 15 to 23 inches (**Figure 3-3** in **Appendix A**). The BLM has worked to gather precipitation data in GSENM and has partnered with the University of Utah to present precipitation data in MesoWest, an interactive online database of precipitation data (University of Utah 2023).

Trends

Surface Water Sources

In accordance with Section 319 of the Clean Water Act, Section 319 funding is awarded each year to the State of Utah through a grant from the EPA. Section 319(h) funds are distributed at the local level to help address water quality issues resulting from nonpoint source pollution and fund restoration projects across the state. These funds can be sought out to support restoration projects within GSENM that address nonpoint source pollution sources. Section 319 funding has been used in the past to fund watershed plans for watersheds within GSENM that have led to the understanding of pollution sources and recommendations for implementation projects.

In 2022, the Utah BLM continued to implement a Healthy Lands and Watershed Restoration program; this program focuses on improving habitat, vegetation, and water quality by reducing erosion from BLM-managed land. These efforts included many watershed improvement projects, which will contribute to improved land health and the long-term reduction of erosion and sediment loading. This will also reduce TDS (salinity). For example, the BLM has partnered with the Escalante River Watershed Partnership and has worked on a range of watershed improvement efforts, such as Russian olive and tamarisk removal, riparian restoration, and data inventory projects.

In the Colorado Plateau ecoregion, creeks, streams, and rivers have experienced diminished instream flow and altered flow regimes created by dams, channelization, canal systems, and water diversions (Bryce et

al. 2012). River flow regulation, channelization, levees, and dikes have eliminated spring flooding in some cases.

PFC assessment data from 2010 to 2014 suggest that the condition on assessed allotments were in functioning condition, or the allotments were moving toward functioning condition. Future PFC assessments and use of data from lotic and riparian and wetland AIM will be necessary to inform PFC trends.

Groundwater Sources

In the 2006 spring study, Northern Arizona University found that the groundwater flow path and length are variable across GSENM (Rice and Springer 2006). This variance was observed when the researchers calculated groundwater residence times for springs discharging from the Navajo Sandstone. It is possible that canyon cutting due to flow erosion is the driver of spring locations throughout GSENM and that this canyon cutting may also affect the flow of groundwater in the planning area (Rice and Springer 2006).

Water Quality

Total dissolved solids (that is, salinity), temperature, total phosphorus, and benthic macroinvertebrate bio-assessments are water quality problems in GSENM. Additional data are needed to determine trends. However, water quality monitoring data has been collected at 10 sites throughout GSENM from 2019 to 2023 per GSENM Water Quality Sampling and Analysis Plan. Preliminary data suggests that water quality problems are believed to be stable and designated beneficial uses are currently being met for all stations.

Water Quantity

The BLM issued BLM Instruction Memorandum 2013-094, Resource Management During Drought (BLM 2013), to provide general guidance regarding BLM program management in the face of drought. Although this guidance is centered on the biological resource programs that have direct impacts on the long-term health of rangelands, the communication and coordination principles also apply to many other resource programs. The procedures outlined in the BLM Instruction Memorandum provide guidelines for line managers regarding their approach to formulating and implementing actions to mitigate the effects of BLM-authorized uses on drought-stressed resources. Not all procedures will be applicable to all situations and, where necessary, these may be adapted or modified to suit local circumstances. This policy is supplemental to standard BLM program procedures; it is intended to be used as a tool to help address and mitigate the impacts of drought (BLM 2013).

Aquatic Assessment, Inventory, and Monitoring

Review and analysis of the lotic AIM data, including the riparian function indicators (**Figure 3-24, Appendix A**) and the water quality indicators (**Diagram 3-2**), show that Upper Johnson Wash, Upper Paria River, and Hackberry Canyon-Cottonwood Creek had the poorest conditions, based on major departures in bank cover and stability, and TDS, total phosphorus, and nitrogen. These three departed watersheds were also categorized as having a high departure from historical conditions during the review and analysis of terrestrial AIM data (see **Section 3.3, Vegetation, Affected Environment**). A combination of lotic and terrestrial AIM analysis identified eight departed watersheds **Figure 3-24 in Appendix A**

(also see **Appendix B**, AIM Analysis Technical Support Document). Additionally, the main waterbody within each departed watershed is also listed on the UDWQ 303(d) list¹⁵ of impaired waters.

Forecasts

Surface Water Sources

To identify ways to improve water quality management, the BLM adapts its water quality monitoring plan to ensure there are enough monitoring sites and sufficient data for 303(d) streams. Additionally, working toward TMDL development within the decision area will guide future efforts to reduce loading to streams in GSENM and improve the water quality.

The BLM is working with local watershed coordinators to compile more comprehensive information through monitoring of other aquatic resources. There are multiple active water quality projects to restore water resources in the decision area that are completed as part of the Colorado River Basin Salinity Control Program. In the past 20 years, 93 features/structures have been repaired or maintained with the effect of capturing sediment in various drainages and watersheds in the decision area (**Figure 3-26**, Riparian Areas and 303(d) Assessed Units, in **Appendix A**). Mitigation of disturbances to saline soils and management practices that mitigate the transport of saline soils are essential for the BLM to comply with the Colorado Plateau Salinity Control Act (BLM 1974) and with water quality standards. The BLM will continue to implement management practices to reduce salt transport on BLM-managed lands.

The BLM works closely with the Escalante River Watershed Partnership, a group composed of a diverse governmental, nongovernmental, and private individual stakeholders with expertise in natural resource research and management disciplines on projects in the Escalante River watershed. As part of the Escalante River Watershed Partnership's riparian restoration project, the Escalante River Watershed Partnership is working toward a goal of monitoring the entire watershed every 3 years and progressing toward the following goals (Escalante River Watershed Partnership 2022):

- Reduction of Russian olive relative cover to less than 5 percent
- Greater than 90 percent relative cover of native woody species
- Evidence of natural recruitment of native species
- Greater than 50 percent relative cover of herbaceous native species
- Less than 10 percent relative cover by secondary weed species of concern

Groundwater Sources

The BLM would continue to work with the USGS and State of Utah to identify priority sites and monitoring wells within the Glen Canyon aquifer and other important regional aquifers in the planning area to develop groundwater-level information to support management decisions.

Water Quantity

For the planning area, the BLM assumes populations in nearby communities will remain constant or increase. Increasing populations are expected to place greater demands on recreational opportunities in

¹⁵ Section 303(d) of the federal Clean Water Act requires states to develop and submit for approval a list of impaired waters every 2 years. This is referred to as the 303(d) list...Waterbodies listed as impaired require additional study to determine the sources of impairment and if appropriate have a Total Maximum Daily Load determination made for the pollutant of concern.

GSENM. Therefore, demand for water supplies to support the public and water-based recreation would experience a corresponding increase. There is unallocated water outside GSENM and the KEPA, and new water rights are anticipated to occur occasionally. The use of the Wide Hollow Reservoir is anticipated to increase, and Henrieville water use is also anticipated to increase. Livestock water uses are anticipated to remain fairly static. Increasing development in areas around Escalante and Boulder is expected to increase water use. Where water use is expected to increase, the BLM will encourage the management of water as a renewable natural resource, consistent with its sustained yield mission and U.S. Department of the Interior policy.

3.4.2 Environmental Consequences

Refer to **Section F.9**, Water Resources, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would management decisions of activities that disturb soils and accelerate erosion affect water resources (groundwater, surface water, wetlands, riparian areas, floodplains, and water quality)?
- How would proposed management impact water quality (and water quality standards set by the State of Utah and the U.S. Environmental Protection Agency) and protection of dependent resources?

Impacts Common to All Alternatives

Impacts from Surface-Disturbing Activities

Decreased vegetation cover and soil compaction would reduce water infiltration, leading to an increase in surface water runoff, soil erosion, and sedimentation of adjacent waterways. Surface-disturbing activities can change the physical characteristics of streams and other surface waterbodies through direct disturbance of stream channels or by increasing runoff from the surrounding watershed. These changes contribute to stream bank erosion, increased turbidity, and degradation of water quality, potentially leading to new surface water impairments or inhibiting resolution of existing impairments.

Although decreased vegetation cover has the potential to contribute to increased sediment loading, research completed in eastern Oregon found that removal of western junipers increased late-season stream flows by 225 percent (Deboodt et al. 2008). Additional data are needed to fully understand the impacts that woody vegetation removal may have on the water resources within GSENM.

Under all alternatives, measures would be required to stabilize soils and minimize surface water runoff for actions on slopes greater than 10 percent and to prohibit or avoid soil-disturbing discretionary actions on slopes greater than 30 percent. Surface-disturbing activities result in disruption or damage of biological soil crusts and create opportunities for the establishment and spread of noxious weeds that provide less vegetation cover than native species (Scott et al. 2017).

Any land acquired by the BLM over the life of the RMP would be managed similarly to the existing OHV area designations of adjoining BLM-managed lands or as stated—or implied—in the transfer. Where clarification is absent, the BLM would manage acquired lands with OHV use limited to designated routes. The type of limitation would be set by implementation-level decisions; until these decisions are made, use

may continue in the same manner and degree consistent with the purposes for which the acquisition was made.

Additionally, under Proclamation 10286, “All federal lands and interests in lands within the boundaries of the GSENM are...withdrawn from all forms of entry, location, selection, sale, or other disposition under the public land laws, from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the GSENM.” As a result, there would be reduced pressure on water resources from mineral-related disturbance activities.

Impacts from Livestock Grazing

Livestock grazing in riparian areas would continue to contribute to reduced water quality in the decision area. This would happen primarily from grazing causing soil erosion, compaction, and runoff into surface waters, reductions in bank stability and riparian canopy cover, and direct inputs of animal waste and nutrients into surface waters. As discussed in the *Affected Environment*, livestock grazing has been determined to contribute to water quality impairments in the planning area, and management actions have been underway to reduce the effects of grazing on water quality.

Impacts from Climate Change

The primary effects on water resources from increasing temperatures include reduced streamflow; increased water salinity, sedimentation, and water temperature; increased droughts and decreased water availability; and reduced riparian and wetland ecosystems. Riparian and wetland areas are likely to decrease in quality and quantity due to increasing temperatures, decreasing precipitation, and decreased groundwater availability. Ongoing climate trends combine with and exacerbate these conditions.

Additionally, as discussed in **Section 3.13**, Fire and Fuels Management, the BLM anticipates the decision area will experience an increase in fire risk and fire severity associated with warming temperatures from climate trends. Increased wildfires could cause increased sediment and decreased vegetation cover in areas where wildfires occur. See **Section 3.13**, Fire and Fuels Management, for more information on the impacts from climate change related to fire and fuels.

Alternative A

Under Alternative A, the BLM would manage water resources to protect and maintain water and natural flows, including water flowing into GSENM from adjacent lands. The BLM would exercise its existing land-management authorities to protect and maintain available water and natural flows into and out of GSENM and allow the development of visitor centers and facilities in nearby communities. The addition of visitor centers and facilities in nearby communities could impact groundwater availability in GSNEM, as well as surrounding water resources. These developments could also impact runoff and infiltration due to impacts of soil-disturbing activities.

Additionally, under Alternative A, management direction would allow water sources to be developed for beneficial recreation- and visitor-related uses in high-use remote areas, such as trailheads and recreational facilities. Management also would allow new water developments and maintenance of existing water developments to improve livestock and wildlife distribution. Under Alternative A, new water developments would be prohibited in relict plant communities and hanging gardens; however, maintenance activities would be allowed if these resources are not affected.

Impacts from water developments would be evaluated on a case-by-case basis. If additional water developments occur throughout GSENM, and precipitation declines because of warming temperatures, there is potential for decreased aquifer functionality. Decreased groundwater levels and availability could affect springs and surface water availability across the decision area. Springs in GSENM provide ecosystem functions and determine much of the natural water flow through GSENM. Studies in the decision area have shown anthropogenic impacts on springs across the decision area, including changes to geomorphology, water quality, landform stability, soil integrity, runout channel configuration, and vegetation composition (Spring Stewardship Institute 2021). Additionally, because the underlying aquifer, Glen Canyon Aquifer contains recharge areas and is partly recharged by precipitation, water availability could also be affected by climate change.

Under Alternative A, surface-disturbing actions in drinking water source-protection zones and culinary water sources would be avoided. The BLM would develop strategies to mitigate any existing BLM-authorized activities that pose a threat to public water systems. Where surface-disturbing activities do not degrade water resources and are consistent with protection of GSENM objects, the BLM would allow surface-disturbing activities within drinking water source-protection zones. In these areas, management would identify permanent facilities locations to best eliminate potential contamination or pollution sources, and design facilities to prevent contaminated discharges to groundwater. Although facilities could be designed to prevent contaminated discharge to groundwater, there is still a potential threat to the groundwater sources dependent on site-specific facility operations and BMPs. These specifics should be evaluated on a project level to determine potential impacts on groundwater protection zones. Risk to groundwater protection zones is related to the connectivity of surface water, proximity, and the depth to groundwater. Groundwater levels vary across the decision area and, therefore, areas where groundwater is closer to the surface are more at risk for contamination based on surface activities.

Under Alternative A, the BLM would continue to manage soil resources as they were designated under the GSENM RMPs (BLM 2020a) and KEPA RMP (BLM 2020b). The 2020 GSENM RMPs and KEPA RMP requires measures to stabilize soils and minimize surface water runoff for slopes greater than 10 percent both during project activities and following project completion. Impacts on water resources associated with soil degradation include greater surface runoff and decreased water quality.

Additionally, **Section 3.2**, Soil Resources, and **Figure 3-5 (Appendix A)** discusses and displays site degradation susceptibility in relation to soil stability. See **Section 3.2** for more information on soils.

Under Alternative A, the BLM would continue to manage livestock resources as they were designated under the GSENM RMPs (BLM 2020a) and KEPA RMP (BLM 2020b). Existing management under Alternative A requires adaptively managing the season of use, duration, and distribution of livestock grazing to meet or move toward meeting BLM Utah Rangeland Health Standards. Actions taken toward improving land health include monitoring; maintaining existing developments; installing new developments, such as water developments; and implementing nonstructural range improvements, such as controlling for or eradicating invasive species. Water gaps of up to one-eighth of a mile would be allowed to provide river access to cattle, while protecting the resources in the area for the following areas: Big Bowns Bench River Pasture, and Deer Creek Allotment River Pasture. Additionally, under Alternative A, livestock management would follow the BLM's current drought policy (BLM 2013).

Under Alternative A, 2,116,200 acres would be available for livestock grazing in watersheds within BLM-managed grazing allotments in GSENM and Glen Canyon (see **Table 3-38**). Impacts on water resources from livestock use are highly variable and depend on both site characteristics and grazing practices. In general, grazing can cause water quality impacts, such as stream bacteria loading from animal manure, including *Cryptosporidium parvum*, *Shigella* sp., and virulent strains of *Escherichia coli* (Hudson 2021). Intensive livestock grazing is also associated with ecological degradation of springs by groundwater extraction and overuse. These impacts include degraded groundwater quality, reduced discharge, soil compaction, and introduction of invasive plant and animal species (Spring Stewardship Institute 2021).

Construction of range improvement features, such as water developments, can result in localized surface disturbance as a result of vegetation removal. However, these features, if installed strategically, can improve livestock distribution across the environment and minimize concentrated surface disturbance. Improper livestock grazing near waterways can impact water quality by increasing *Escherichia coli* concentrations in waterbodies; this can be a health concern because some water sources are used for drinking water in backcountry sites.

Under Alternative A, the BLM would continue to manage resources as they were designated under the GSENM RMPs (BLM 2020a) and the KEPA RMP (BLM 2020b). OHV use on routes would be as identified in the 2000 MMP, unless otherwise specifically addressed in the 2020 Final EIS. Mechanized travel and equipment would be limited to routes designated specifically for such use and routes where OHV use is allowed. The development of trails for public safety would be allowed for the protection of resources or to provide opportunities for visitors. Specific route designation is an implementation-level decision that the BLM will address in a separate NEPA process.

Under Alternative A, 2,800 acres within GSENM's watersheds would continue to be closed to OHV travel, and 1,862,800 acres would continue limiting OHV travel to existing and designated routes. Impacts on water resources associated with increased OHV travel include destabilized soils and erosion, as well as pollutants that can cause sedimentation and water quality impacts (see **Table 3-40**).

Under Alternative A, within GSENM's watersheds, 630,200 acres would continue to be open to ROW authorization; 332,800 acres would continue to be managed as ROW avoidance areas; 881,300 acres would continue to be managed as ROW exclusion areas; and 21,100 acres would continue to be managed as ROW seasonal avoidance areas. Impacts on water resources associated with increased travel and transportation include destabilized soils and erosion, which can cause sedimentation and turbid water (see **Table 3-39**).

Under Alternative A, the BLM would continue to manage recreation and visitor services as they were designated under the GSENM RMPs (BLM 2020a) and the KEPA RMP (BLM 2020b). The existing management under Alternative A allows camping adjacent to range facilities and isolated water sources unless otherwise posted. It limits mechanized, nonmechanized, motorized, and nonmotorized events to areas designated for motorized and mechanized use. It also requires the use of disposable, self-contained human waste management systems within 300 feet of water sources, and it requires group size limits to protect riparian and wildlife resources. It also prohibits SRP holders from camping within 200 feet of riparian areas unless SRP holders can demonstrate that there would be no impacts on riparian vegetation or PFC. Limiting travel would include less roads and trails in the area and indirectly protect riparian areas from surface disturbance and sedimentation. If new roads or trails must be located in riparian areas,

Table 3-38. Watersheds and Associated Acreage of Livestock Management Allocations by Alternative

Watershed	Acreage within BLM-managed Grazing Allotments (% of the Total Watershed)	Total Acreage	Management Decision	Acres of Grazing Allotments Managed by BLM in GSENM and Glen Canyon			
				Alternative A	Alternative B	Alternative C	Alternative D
Aztec Creek-Lake Powell	88,800 (38)	235,300	Available for livestock grazing	54,000	51,200	27,500	27,500
			Unavailable for livestock grazing	34,900	37,700	61,400	61,400
Boulder Creek-Escalante River	92,400 (40)	233,700	Available for livestock grazing	88,400	46,700	46,700	24,700
			Unavailable for livestock grazing	4,000	45,700	45,700	67,700
Croton Canyon	129,300 (99)	130,400	Available for livestock grazing	129,300	129,300	124,600	124,600
			Unavailable for livestock grazing	—	—	4,700	4,700
Escalante River-Colorado River	8,700 (5)	182,029	Available for livestock grazing	8,300	8,300	8,700	8,700
			Unavailable for livestock grazing	400	400	—	—
Fortymile Gulch-Escalante River	162,500 (84)	194,600	Available for livestock grazing	153,500	153,500	107,100	107,100
			Unavailable for livestock grazing	9,100	9,100	55,400	55,400
Hackberry Canyon-Cottonwood Creek	68,100 (98)	69,300	Available for livestock grazing	68,100	68,100	68,100	1,100
			Unavailable for livestock grazing	—	—	—	66,900
Halls Creek	3,700 (3)	113,200	Available for livestock grazing	1,500	1,500	1,500	600
			Unavailable for livestock grazing	2,200	2,200	2,200	3,100
Harris Wash	140,000 (85)	166,000	Available for livestock grazing	138,500	138,500	138,500	138,500
			Unavailable for livestock grazing	1,900	1,900	1,900	1,900
Headwaters Escalante River	34,900 (17)	204,100	Available for livestock grazing	34,800	32,100	32,100	31,800
			Unavailable for livestock grazing	100	2,900	2,900	3,100
Horse Canyon-Escalante River	169,100 (87)	194,300	Available for livestock grazing	144,500	130,400	130,400	10,200
			Unavailable for livestock grazing	24,700	38,800	38,800	158,900
Kanab Creek Headwaters	3,200 (3)	124,200	Available for livestock grazing	3,200	3,200	3,200	3,200
			Unavailable for livestock grazing	—	—	—	—
Last Chance Creek	165,300 (94)	175,800	Available for livestock grazing	165,300	165,300	154,800	96,500
			Unavailable for livestock grazing	—	—	10,500	68,800
Lower Buckskin Gulch	11,700 (10)	122,100	Available for livestock grazing	11,700	11,700	11,700	5,600
			Unavailable for livestock grazing	—	—	—	6,100
Lower Wahweap Creek	79,300 (52)	152,600	Available for livestock grazing	79,300	79,300	78,400	22,500
			Unavailable for livestock grazing	—	—	800	56,800
Middle Paria River	130,300 (91)	143,900	Available for livestock grazing	129,600	129,600	129,600	64,300
			Unavailable for livestock grazing	600	600	600	65,900

Watershed	Acreage within BLM-managed Grazing Allotments (% of the Total Watershed)	Total Acreage	Management Decision	Acres of Grazing Allotments Managed by BLM in GSENM and Glen Canyon			
				Alternative A	Alternative B	Alternative C	Alternative D
Moody Creek-Escalante River	130,300 (91)	163,800	Available for livestock grazing	67,800	67,800	67,800	60,800
			Unavailable for livestock grazing	42,900	42,900	42,900	49,900
Sheep Creek	41,500 (66)	63,100	Available for livestock grazing	41,500	24,700	24,700	5,300
			Unavailable for livestock grazing	—	16,700	16,700	36,100
Twentymile Wash-Twentyfive Mile Wash	139,300 (100)	139,300	Available for livestock grazing	135,100	135,100	135,100	135,000
			Unavailable for livestock grazing	4,300	4,300	4,300	4,400
Upper Buckskin Gulch	164,400 (87)	189,900	Available for livestock grazing	163,600	163,500	163,500	132,600
			Unavailable for livestock grazing	800	1,000	1,000	31,800
Upper Johnson Wash	94,900 (52)	183,800	Available for livestock grazing	94,900	94,600	94,600	49,100
			Unavailable for livestock grazing	—	300	300	45,800
Upper Paria River	100,200 (59)	169,300	Available for livestock grazing	100,200	100,200	100,200	10,300
			Unavailable for livestock grazing	—	—	—	89,900
Upper Wahweap Creek	135,800 (99)	137,400	Available for livestock grazing	135,800	135,800	135,800	700
			Unavailable for livestock grazing	—	—	—	135,100
Warm Creek	123,700 (93)	132,900	Available for livestock grazing	123,700	123,700	114,100	82,300
			Unavailable for livestock grazing	—	—	9,500	41,300
West Canyon Creek-Lake Powell	17,800 (13)	140,900	Available for livestock grazing	17,800	17,800	11,500	11,500
			Unavailable for livestock grazing	—	—	6,400	6,400
White Sage Wash	26,000 (19)	137,000	Available for livestock grazing	26,000	26,000	26,000	4,100
			Unavailable for livestock grazing	—	—	—	21,900

Source: BLM GIS 2022

Table 3-39. Watersheds and Associated Acreage of Rights-of-Way Management by Alternative

Watershed	Acreage within the Decision Area (% of the Total Watershed)	Total Acreage	Management	Acres within GSENM Boundary			
				Alternative A	Alternative B	Alternative C	Alternative D
Aztec Creek-Lake Powell	31,700 (13)	235,300	Open to ROW authorization	400	0	0	0
			ROW avoidance area	900	0	0	0
			ROW exclusion area	30,400	31,700	31,700	31,700
Boulder Creek-Escalante River	93,600 (40)	233,700	Open to ROW authorization	12,700	12,700	0	0
			ROW avoidance area	4,600	4,600	8,800	1,500
			ROW exclusion area	75,900	75,900	84,400	91,700
Croton Canyon	121,800 (93)	130,400	Open to ROW authorization	17,300	0	0	0
			ROW avoidance area	7,900	16,800	1,400	0
			ROW exclusion area	96,600	105,000	120,400	121,700
Fortymile Gulch-Escalante River	103,000 (53)	194,600	Open to ROW authorization	60,700	0	0	0
			ROW avoidance area	7,300	54,000	49,500	6,700
			ROW exclusion area	35,000	49,000	53,500	96,300
Hackberry Canyon-Cottonwood Creek	69,300 (100)	69,300	Open to ROW authorization	0	0	0	0
			ROW avoidance area	18,900	18,900	13,800	0
			ROW exclusion area	49,200	49,200	54,300	68,100
Halls Creek	4,000 (4)	113,200	Open to ROW authorization	0	300	0	0
			ROW avoidance area	4,000	3,700	2,300	0
			ROW exclusion area	0	0	1,700	4,000
Harris Wash	131,700 (79)	166,000	Open to ROW authorization	56,200	4,900	0	0
			ROW avoidance area	21,900	72,000	26,100	3,800
			ROW exclusion area	52,400	53,800	104,500	126,800
Headwaters Escalante River	12,300 (6)	204,100	Open to ROW authorization	4,900	3,900	0	0
			ROW avoidance area	3,700	5,000	4,100	200
			ROW exclusion area	3,600	3,300	8,100	12,000
Horse Canyon-Escalante River	163,000 (84)	194,300	Open to ROW authorization	43,100	43,100	0	0
			ROW avoidance area	43,400	43,400	63,300	1,800
			ROW exclusion area	76,500	76,500	99,700	161,200
Kanab Creek Headwaters	2,200 (2)	124,200	Open to ROW authorization	2,100	0	0	0
			ROW avoidance area	0	2,200	2,200	2,000
			ROW exclusion area	0	0	0	200

3. Affected Environment and Environmental Consequences (Water Resources)

Watershed	Acreage within the Decision Area (% of the Total Watershed)	Total Acreage	Management	Acres within GSENM Boundary			
				Alternative A	Alternative B	Alternative C	Alternative D
Last Chance Creek	141,600 (81)	175,800	Open to ROW authorization	26,900	0	0	0
			ROW avoidance area	16,000	30,700	19,400	0
			ROW exclusion area	98,700	110,900	122,200	141,600
Lower Buckskin Gulch	6,300 (5)	122,100	Open to ROW authorization	4,600	0	0	0
			ROW avoidance area	1,700	6,300	6,300	2,400
			ROW exclusion area	0	0	0	3,900
Lower Wahweap Creek	62,400 (41)	152,600	Open to ROW authorization	28,900	2,200	0	0
			ROW avoidance area	12,400	36,700	19,600	3,100
			ROW exclusion area	21,000	23,500	42,800	59,200
Middle Paria River	132,700 (92)	143,900	Open to ROW authorization	37,000	37,000	4,200	1,000
			ROW avoidance area	19,000	19,000	38,200	17,700
			ROW exclusion area	68,800	68,800	82,700	106,400
			ROW seasonal avoidance area	3,900	3,900	3,600	3,600
Moody Creek-Escalante River	30,200 (18)	163,800	Open to ROW authorization	11,100	0	0	0
			ROW avoidance area	11,900	23,100	400	200
			ROW exclusion area	7,100	7,100	29,900	30,000
Sandy Creek-Fremont River	200 (<1)	245,500	Open to ROW authorization	0	0	0	0
			ROW avoidance area	200	200	200	0
			ROW exclusion area	0	0	0	200
Sheep Creek	42,900 (68)	63,100	Open to ROW authorization	21,800	500	0	0
			ROW avoidance area	11,200	20,800	31,900	5,700
			ROW exclusion area	8,400	20,100	9,600	35,800
Twentymile Wash-Twentyfive Mile Wash	132,200 (95)	139,300	Open to ROW authorization	50,900	0	0	0
			ROW avoidance area	7,900	54,500	39,200	3,800
			ROW exclusion area	73,500	77,700	93,000	128,400
Upper Buckskin Gulch	159,400 (84)	189,900	Open to ROW authorization	106,200	13,000	4,400	800
			ROW avoidance area	12,500	106,800	113,000	43,500
			ROW exclusion area	25,600	28,400	27,700	100,700
			ROW seasonal avoidance area	11,500	7,600	10,700	10,700
Upper Johnson Wash	86,600 (47)	183,800	Open to ROW authorization	73,300	73,300	0	0
			ROW avoidance area	11,300	11,300	84,200	51,100
			ROW exclusion area	0	0	300	33,500
			ROW seasonal avoidance area	200	200	100	100

Watershed	Acreage within the Decision Area (% of the Total Watershed)	Total Acreage	Management	Acres within GSENM Boundary			
				Alternative A	Alternative B	Alternative C	Alternative D
Upper Paria River	92,800 (55)	169,300	Open to ROW authorization	3,800	3,800	0	0
			ROW avoidance area	47,400	47,400	42,400	2,800
			ROW exclusion area	40,700	40,700	49,500	89,100
Upper Wahweap Creek	135,800 (99)	137,400	Open to ROW authorization	7,200	7,200	0	0
			ROW avoidance area	43,600	43,600	36,200	0
			ROW exclusion area	84,900	84,900	99,600	135,800
Warm Creek	97,800 (74)	132,900	Open to ROW authorization	43,500	1,000	0	0
			ROW avoidance area	23,300	52,700	27,000	200
			ROW exclusion area	31,000	44,100	70,800	97,700
West Canyon Creek-Lake Powell	2,000 (1)	140,900	Open to ROW authorization	0	0	0	0
			ROW avoidance area	0	0	0	0
			ROW exclusion area	2,000	2,000	2,000	2,000
White Sage Wash	24,800 (18)	137,000	Open to ROW authorization	17,700	17,700	2,300	500
			ROW avoidance area	1,500	1,500	17,400	3,600
			ROW exclusion area	0	0	0	15,700
			ROW seasonal avoidance area	5,500	5,500	5,000	5,000

Source: BLM GIS 2022

Acres are all within GSENM's boundary.

Table 3-40. Watersheds and Associated Acreage of Travel Management Allocations by Alternative

Watershed	Acreage within the Decision Area (% of the Total Watershed)	Total Acreage	Management Direction	Acres within GSENM Boundary			
				Alternative A	Alternative B	Alternative C	Alternative D
Aztec Creek-Lake Powell	31,700 (13)	235,300	Closed to OHV travel	0	31,700	31,700	31,700
			OHV travel limited to existing and designated routes	31,700	0	0	0
Boulder Creek-Escalante River	93,600 (40)	233,700	Closed to OHV travel	0	81,400	84,100	91,600
			OHV travel limited to existing and designated routes	93,200	11,800	9,100	1,700
Croton Canyon	121,800 (93)	130,400	Closed to OHV travel	0	105,000	119,700	120,000
			OHV travel limited to existing and designated routes	121,800	16,800	2,100	1,800
Fortymile Gulch-Escalante River	103,000 (53)	194,600	Closed to OHV travel	0	37,700	49,000	94,500
			OHV travel limited to existing and designated routes	103,000	65,400	54,000	8,500
Hackberry Canyon-Cottonwood Creek	69,300 (100)	69,300	Closed to OHV travel	0	52,600	53,300	63,100
			OHV travel limited to existing and designated routes	68,100	15,500	14,800	5,000
Halls Creek	4,000 (4)	113,200	Closed to OHV travel	0	0	1,700	3,800
			OHV travel limited to existing and designated routes	4,000	4,000	2,300	200
Harris Wash	131,700 (79)	166,000	Closed to OHV travel	0	54,400	103,200	125,000
			OHV travel limited to existing and designated routes	130,500	76,200	27,400	5,600
Headwaters Escalante River	12,300 (6)	204,100	Closed to OHV travel	0	3,600	8,000	10,200
			OHV travel limited to existing and designated routes	12,200	8,600	4,200	1,900
Horse Canyon-Escalante River	163,000 (84)	194,300	Closed to OHV travel	0	83,600	99,100	159,400
			OHV travel limited to existing and designated routes	163,000	79,300	63,800	3,600
Kanab Creek Headwaters	2,200 (2)	124,200	Closed to OHV travel	0	0	0	200
			OHV travel limited to existing and designated routes	2,200	2,200	2,200	2,000

3. Affected Environment and Environmental Consequences (Water Resources)

Watershed	Acreage within the Decision Area (% of the Total Watershed)	Total Acreage	Management Direction	Acres within GSENM Boundary			
				Alternative A	Alternative B	Alternative C	Alternative D
Last Chance Creek	141,600 (81)	175,800	Closed to OHV travel	0	110,800	121,500	140,300
			OHV travel limited to existing and designated routes	141,600	30,800	20,100	1,300
Lower Buckskin Gulch	6,300 (5)	122,100	Closed to OHV travel	0	0	0	3,900
			OHV travel limited to existing and designated routes	6,300	6,300	6,300	2,400
Lower Wahweap Creek	62,400 (41)	152,600	Closed to OHV travel		23,000	49,600	51,200
			OHV travel limited to existing and designated routes	62,400	39,400	12,700	11,100
Middle Paria River	132,700 (92)	143,900	Closed to OHV travel	1,600	73,500	78,400	103,200
			OHV travel limited to existing and designated routes	127,100	55,200	50,400	25,500
Moody Creek-Escalante River	30,200 (18)	163,800	Closed to OHV travel	0	7,100	29,900	30,000
			OHV travel limited to existing and designated routes	30,200	23,100	300	200
Sandy Creek-Fremont River	200 (<1)	245,500	Closed to OHV travel	0	0	0	200
			OHV travel limited to existing and designated routes	200	200	200	0
Sheep Creek	42,900 (68)	63,100	Closed to OHV travel	0	9,000	19,300	33,200
			OHV travel limited to existing and designated routes	41,500	32,500	22,200	8,200
Twentymile Wash-Twentyfive Mile Wash	132,200 (95)	139,300	Closed to OHV travel	0	77,500	106,500	127,800
			OHV travel limited to existing and designated routes	132,200	54,700	25,800	4,400
Upper Buckskin Gulch	159,400 (84)	189,900	Closed to OHV travel	1,200	25,500	26,900	104,400
			OHV travel limited to existing and designated routes	154,600	130,300	128,900	51,400
Upper Johnson Wash	86,600 (47)	183,800	Closed to OHV travel	0	0	0	26,400
			OHV travel limited to existing and designated routes	84,700	84,700	84,700	58,300

3. Affected Environment and Environmental Consequences (Water Resources)

Watershed	Acreage within the Decision Area (% of the Total Watershed)	Total Acreage	Management Direction	Acres within GSENM Boundary			
				Alternative A	Alternative B	Alternative C	Alternative D
Upper Paria River	92,800 (55)	169,300	Closed to OHV travel	0	44,300	45,600	69,000
			OHV travel limited to existing and designated routes	91,900	47,600	46,300	22,900
Upper Wahweap Creek	135,800 (99)	137,400	Closed to OHV travel	0	95,400	110,000	135,400
			OHV travel limited to existing and designated routes	135,800	40,400	25,800	400
Warm Creek	97,800 (74)	132,900	Closed to OHV travel	0	34,900	70,500	95,800
			OHV travel limited to existing and designated routes	97,800	62,900	27,400	2,100
West Canyon Creek-Lake Powell	2,000 (1)	140,900	Closed to OHV travel	0	2,000	2,000	2,000
			OHV travel limited to existing and designated routes	2,000	0	0	0
White Sage Wash	24,800 (18)	137,000	Closed to OHV travel	0	0	0	16,600
			OHV travel limited to existing and designated routes	24,700	24,700	24,700	8,200

Source: BLM GIS 2022
Acres are all within GSENM's boundary.

Alternative A would protect riparian resources by avoiding paralleling streams unless absolutely necessary. This avoidance would reduce surface disturbance and the subsequent sediment loading. Alternative A would also protect riparian resources by locating stream crossings where the bank is low, the surfaces are firm, and riparian and aquatic ecosystems would be best complemented. Alternative A would designate routes, including hiking and equestrian trails, to avoid sensitive water and soil resources (seeps, springs, and sensitive soils) where monitoring has shown degradation from recreation.

Under Alternative A, the BLM would continue to manage fire resources as they were designated under the GSENM RMPs (BLM 2020a). General goals include protecting life, property, and resource values. General impacts on water resources associated with fire management include erosion and sedimentation, as well as debris flows that can damage ecological function. See **Section 3.13**, Fire and Fuels Management, for more information.

Under Alternative A, the BLM would continue to manage resources as they were designated under the GSENM RMPs (BLM 2020a) and the KEPA RMP (BLM 2020b). Utah's Riparian Protection Area policy requires that new surface-disturbing activities within 330 feet of riparian areas and wetlands are to be avoided unless it can be shown that (1) there are no practical alternatives (such as a designated utility corridor), (2) all long-term impacts could be fully mitigated, or (3) the activity would benefit and enhance the riparian area. Additionally, ROW avoidance would be required. Impacts on water resources associated with vegetation primarily include degradation of soil and erosion as a result of surface-disturbing activities, which can lead to sedimentation of water resources. Under Alternative A, early detection and rapid response of noxious weed species is required to prevent the establishment of these plant species throughout GSENM. Noxious weeds can quickly outcompete native plants.

Alternative B

Under Alternative B, the BLM would manage water resources to maximize the potential for discretionary actions that are compatible with the protection of GSENM objects. This alternative requires that watershed-level restoration or actions would consider hydrological functions and nexuses. It prevents the impairment of water quality through proactive management actions and by ensuring discretionary actions would not degrade water quality; it would implement actions to restore impaired waters listed in the most recent state 305b Water Quality Report, when the extent of impairment can be substantially and measurably remedied through BLM actions.

Alternative B would prevent the loss of water (both surface and groundwater) through proactive management actions and by ensuring discretionary actions minimize water use. It would implement actions to protect and restore the quantity and quality of water (surface and groundwater) within GSENM. It would allow water sources to be developed to support recreation- and visitor-related uses in high-use areas, such as trailheads and recreational facilities. It would allow for new water developments if they contribute to protection or restoration, or increase the resiliency of GSENM objects. Minimizing water use protects water availability for riparian vegetation, floodplains, wetlands, and other ecologic functions.

Under Alternative A, existing water developments for livestock or wildlife could be maintained or modified, if they protect or restore the resiliency of GSENM objects. Alternative B would prohibit new water developments in natural plant communities that lack invasive species. It also would allow maintenance of existing developments in a manner that minimizes impacts on natural plant communities. Maintenance of water developments has been shown to improve the condition of water sources,

specifically springs, across the decision area, especially those developed for livestock and wildlife (Spring Stewardship Institute 2021). It would avoid degradation of water resources from surface or subsurface discretionary actions. Therefore, Alternative B would be more protective of water resources because of the prohibition of new water developments in areas that do not have invasive species present.

Under Alternative B, the BLM would manage resources to maximize the potential for discretionary actions that are compatible with the protection of GSENM objects. Management under Alternative B requires measures that stabilize soils and minimize surface water runoff for actions on slopes greater than 10 percent. It requires avoidance of soil-disturbing, discretionary actions on slopes greater than 30 percent except for emergency stabilization. Impacts on water resources from soil-disturbing activities include erosion and the associated sedimentation of water resources.

Management under Alternative B requires that within 2 years, a land health assessment must be completed, as well as determinations, if needed, on allotments within the following watersheds: Horse Canyon-Escalante River, Upper Paria, Hackberry Canyon-Cottonwood Creek, Upper Wahweap Creek, Upper Johnson Creek, White Sage Wash, Boulder Creek-Escalante River, and Middle Paria. Once the assessments, determinations, and fully processed permit renewals have been completed in these watersheds, a plan would be implemented to conduct land health assessments and determinations, and to fully process permit renewals across GSENM, which would be completed within 10 years.

Alternative B would be more protective of water resources than Alternative A if the requirement to complete land health assessments led to the identification of factors that would be addressed in the case that water quality or riparian Land Health Standards were not met.

Similar to Alternative A, Alternative B also would adaptively manage the season of use, duration, and distribution of livestock grazing to meet or move toward meeting BLM Utah Rangeland Health Standards, before considering changes to the stocking rate, including the improvements of livestock distribution through range improvements, salting, supplements, or other techniques; analyzing the adjustment of the season of use, duration, and recovery periods based on monitoring data, during the permit-renewal NEPA process; providing flexibility in grazing dates; and managing for conditions rather than for the calendar year. It also requires temporarily suspending AUMs in allotments during drought years. Under Alternative B, 2,037,300 acres would be available for livestock grazing in watersheds within BLM-managed grazing allotments in GSENM and Glen Canyon (see **Table 3-38**).

Under Alternative B, it is required that for routes designated for public use, future travel management planning (that is, designating routes as open, limited, or closed) would consider motorized, mechanized, and nonmotorized/nonmechanized route designations and areas of vulnerable soils. Incorporating an analysis of vulnerable soils in future travel management planning could limit travel in increased erosion risk areas.

Under Alternative B, within GSENM's watersheds, 85,100 acres would be open to ROW authorization; 790,800 acres would be managed as ROW avoidance areas; 976,400 acres would be managed as ROW exclusion areas; and 13,300 acres would be managed as ROW seasonal avoidance areas (**Table 3-39**). Impacts on water resources associated with ROW development include destabilized soils and erosion, which can cause sedimentation and turbid water.

Management under Alternative B requires the use of personal waste systems within 300 feet of water sources. Group size limits may also be adjusted to protect other resources values, including riparian areas. Under Alternative B, 953,100 acres within GSENM’s watersheds would be closed to OHV travel, and 912,600 acres would have OHV travel limited to existing and designated routes. Impacts on water resources associated with increased OHV travel include destabilized soils, erosion, and pollutants, which can cause sedimentation and water quality impacts (see **Table 3-40**).

Implementation of landscape-scale ecosystem restoration projects to restore functional vegetation communities, as well as the use of wildland fire, would be required across GSENM under Alternative B. The BLM would also stabilize, rehabilitate, and restore landscape characteristics after wildland fires to restore native ecosystems. Additionally, under Alternative B, it would be required that new discretionary actions within 330 feet of riparian areas and wetlands be avoided unless topographic boundaries limit the distance, and the action would result in no adverse impact on riparian areas or wetlands. It would also prohibit discretionary actions within riparian communities associated with hanging gardens. The disturbance and removal of vegetation cause soil degradation and increased erosion, which can lead to sedimentation and water quality impairment in water resources.

Alternative C

Under Alternative C, four management areas similar to those used in the 2000 MMP would be established: front country area, passage area, outback area, and primitive area. Alternative C would be the same as Alternative B in that it would require consideration of hydrological functions and nexuses for watershed-level restoration or actions. It would prevent the impairment of water quality through proactive management actions and ensure discretionary actions would not degrade water quality. It also would implement actions to restore impaired waters listed in the most recent State 305b Water Quality Report, when the extent of impairment can be substantially and measurably remedied through BLM actions; it would prevent the loss of water quantities in GSENM through proactive management actions and ensure discretionary actions minimize water use. It also would implement actions to protect and restore the quantity and quality of water in GSENM. It would prohibit new water developments in natural plant communities, and it would avoid degradation of water resources from surface or subsurface discretionary actions in all surface and subsurface drinking water protection zones.

Table 3-4I shows the acres of management areas located in watersheds. Acres included in **Table 3-4I** are within GSENM’s boundary. Additionally, **Section 3.2**, Soil Resources, and **Figure 3-5 (Appendix A)** discusses and displays site degradation susceptibility in relation to soil stability. See **Section 3.2** for more information on soils.

Table 3-4I. Watersheds and Associated Acreage of Management Areas

Watershed	Acreage within the Decision Area (% of Total Watershed)	Total Acreage	Acres within GSENM Boundary			
			Front Country Area	Passage Area	Outback Area	Primitive Area
Aztec Creek-Lake Powell	31,700 (13)	235,300	0	0	0	31,700
Boulder Creek-Escalante River	93,200 (40)	233,700	3,700	2,500	5,200	81,900
Croton Canyon	121,800 (93)	130,400	0	0	4,800	117,000
Fortymile Gulch-Escalante River	103,000 (53)	194,600	0	8,400	53,800	40,800

Watershed	Acreage within the Decision Area (% of Total Watershed)	Total Acreage	Acres within GSENM Boundary			
			Front Country Area	Passage Area	Outback Area	Primitive Area
Hackberry Canyon-Cottonwood Creek	69,300 (100)	69,300	0	5,400	11,100	51,500
Halls Creek	4,000 (4)	113,200	0	200	2,200	1,600
Harris Wash	131,700 (79)	166,000	10,900	3,800	22,800	93,100
Headwaters Escalante River	12,300 (6)	204,100	2,000	300	3,200	6,700
Horse Canyon-Escalante River	162,900 (84)	194,300	0	8,200	59,700	95,100
Kanab Creek Headwaters	2,200 (2)	124,200	0	100	2,100	0
Last Chance Creek	141,600 (81)	175,800	0	4,900	17,700	119,000
Lower Buckskin Gulch	6,300 (5)	122,100	300	0	6,000	0
Lower Wahweap Creek	62,400 (41)	152,600	200	100	19,800	42,200
Middle Paria River	128,700 (89)	143,900	13,200	3,100	34,200	78,300
Moody Creek-Escalante River	30,200 (18)	163,800	0	300	500	29,500
Sandy Creek-Fremont River	200 (<1)	245,500	0	0	200	0
Sheep Creek	42,900 (68)	63,100	0	500	32,300	8,600
Twentymile Wash-Twentyfive Mile Wash	132,200 (95)	139,300	0	7,300	40,500	85,100
Upper Buckskin Gulch	159,400 (84)	189,900	2,000	2,300	126,000	25,400
Upper Johnson Wash	84,700 (46)	183,800	1,400	800	82,400	0
Upper Paria River	91,800 (54)	169,300	3,100	1,300	43,000	44,300
Upper Wahweap Creek	135,800 (99)	137,400	0	0	37,000	98,800
Warm Creek	97,800 (74)	132,900	0	2,200	40,900	69,800
West Canyon Creek-Lake Powell	2,000 (1)	140,900	0	0	0	2,000
White Sage Wash	24,700 (18)	137,000	800	0	23,900	0

Source: BLM GIS 2022

The protection of the water supply would be more prioritized in Alternative C than Alternative A. This is because Alternative C would allow development and maintenance of water sources to support recreation- and visitor-related uses only in the front country area, rather than the entire decision area, and, as a result, fewer water sources would likely be developed or maintained. For passage, outback, and primitive areas, Alternative C would also be more protective of water supply than Alternative A in that it would prohibit new recreation-related water developments, unless necessary for natural resources maintenance, or restoration or protection of GSENM objects. Additionally, under Alternative C, new water developments would be prohibited in the primitive area, unless a primary purpose of the water development is to protect or restore the resiliency of GSENM objects. It also would maintain water developments for livestock or wildlife or modify them if they protect, restore, or increase resiliency of GSENM objects.

The BLM would manage soil resources to protect and restore intact and resilient area management to carefully allow for discretionary uses in appropriate settings under Alternative C. Alternative C would require measures to stabilize soils and minimize surface water runoff for actions on slopes greater than 10 percent, which is the same as under Alternative B. Alternative C is also the same as Alternative B in that it requires avoiding soil-disturbing, discretionary actions on slopes greater than 30 percent except for emergency stabilization. Alternative C would be more protective than Alternative A because it prohibits soil-disturbing actions on areas of soil vulnerability where there is increased opportunity for soil erosion

in the outback and primitive areas. Impacts on water resources that are associated with soil erosion include increased water turbidity and decreased water quality and aquatic habitat. See **Table 3-41** for a list of departed watersheds and associated acreage that are in the outback and primitive areas.

Under Alternative C, the BLM would not authorize modifications to structural range improvements until a land health assessment and determination are completed for the allotment in the applicable watershed. Any modifications to the structural range improvements must support the achievement of the BLM Utah Standards for Rangeland Health and must ensure that they are consistent with the protection and restoration of GSENM objects. This is more protective than Alternative A, which would not require a land health assessment to be completed before the maintenance and modification of structural range improvements.

Alternative C is the same as Alternative B in that it also would adaptively manage the season of use, duration, and distribution of livestock grazing to meet or move toward meeting BLM Utah Rangeland Health Standards, before considering changes to stocking rate, including the improvements of livestock distribution through range improvements, salting, supplements, or other techniques; analyzing the adjustment of the season of use, duration, and recovery periods based on monitoring data, during the permit-renewal NEPA process; providing flexibility in grazing dates; and managing for conditions rather than for the calendar year. It also would require temporarily suspending AUMs in allotments during drought years. Under Alternative C, 1,927,000 acres would be available for livestock grazing in watersheds within BLM-managed grazing allotments in GSENM and Glen Canyon (see **Table 3-38**).

Under Alternative C, route designations would remain as directed under the 2000 MMP until travel management planning is complete. Additionally, for routes designated for public use, management under Alternative C would require future travel management to only consider the designation of OHV routes that would be in addition to the 2000 GSENM Travel Management Plan (TMP) for public use, as modified by ongoing planning efforts (see **Table 3-40**). Under Alternative C, 1,209,900 acres in GSENM's watersheds would be closed to OHV travel, and 655,800 acres would have OHV travel limited to existing and designated routes. Alternative C also requires that the BLM consider motorized, mechanized, and nonmotorized/nonmechanized route designations, and reduce opportunities for motorized and mechanized travel in areas of vulnerable soils.

Under Alternative C, within GSENM's watersheds, 10,900 acres would be open to ROW authorization within GSENM's departed watersheds; 646,600 acres would be managed as ROW avoidance areas; 1,188,600 acres would be managed as ROW exclusion areas; and 19,500 acres would be managed as ROW seasonal avoidance areas (see **Table 3-39**).

Alternative C is the same as Alternative B in that it would limit or prohibit camping in sensitive resource areas and in different areas. It would require the use of personal waste systems within 300 feet of water sources. Group size limits could also be adjusted to protect other resources values, including riparian areas.

Alternative C would be the same as Alternative B in that it would require the implementation of landscape-scale ecosystem restoration projects to restore functional vegetation communities. It also would require the use of wildland fire across GSENM for fire suppression. It would also be the same as Alternative B in that it would, where possible, prioritize wildland fire to protect, maintain, and enhance resources and to function in its natural ecological role. The decision to let fires burn would occur if: 1) the fire is naturally

caused; 2) the Fire Management Plan identifies the area as one in which fire might be used as a tool and such use is concurred to by an agency administrator or fire escapes initial attack; and 3) the Wildland Fire Decision Support System results in such a decision. Management would be the same as under Alternative B as the BLM would avoid new discretionary actions within 330 feet of riparian areas and wetlands unless topographic boundaries limit the distance, and the action would result in no net loss of riparian areas or wetlands. Alternative C would be the same as Alternative B in that it would prohibit discretionary actions within riparian communities associated with hanging gardens.

Alternative D

Under Alternative D, the BLM would manage resources to maximize natural processes by limiting discretionary uses. This alternative would be the same as Alternative B in that it would require consideration of hydrological functions and nexuses for watershed-level restoration or actions. Also, it would prevent the impairment of water quality through proactive management actions and ensure discretionary actions would not degrade water quality. It also would implement actions to restore impaired waters listed in the most recent State 305b Water Quality Report, when the extent of impairment can be substantially and measurably remedied through BLM actions.

Alternative D would prevent the loss of water (surface and groundwater) in GSENM through proactive management actions. It is more protective of water resources because it requires that discretionary actions would not cause a net loss of water quantity in the applicable watershed or aquifer. It would also implement actions that protect and enhance or restore the quantity of water in GSENM, without the development of additional human-made infrastructure.

Unlike Alternative A, Alternative D would prohibit new recreation-related water developments, unless beneficial for natural resource maintenance or restoration, or protection of GSENM objects. Alternative D would prohibit new water developments in natural plant communities that lack invasive species, and existing improvements would be removed unless this would harm resources. Management under Alternative D would prohibit degradation of water resources from surface and subsurface discretionary actions in all surface and groundwater drinking water source-protection zones, culinary water sources, and sole-source aquifers, as identified by the UDEQ, Division of Drinking Water.

The BLM would manage resources to maximize natural processes by limiting discretionary uses in this alternative. Land use allocations would curtail discretionary uses, and the prohibition of soil-disturbing, discretionary actions on slopes greater than 30 percent except for emergency stabilization would be required. This is more stringent than Alternative A, which does not require avoidance of actions on slopes greater than 30 percent.

Under Alternative D, within GSENM watersheds, 2,300 acres would be open to ROW authorization; 150,100 acres would be managed as ROW avoidance areas; 1,693,700 acres would be managed as ROW exclusion areas; and 19,500 acres would be managed as ROW seasonal avoidance areas (see **Table 3-39**).

Under Alternative D, the BLM would complete land health assessments and determinations (if needed), and fully process permit renewals across GSENM within 10 years. If a land health determination indicates that grazing use is not consistent with the provisions of 43 CFR 4180, then the permitted use must decrease in accordance with 43 CFR 4110.3-2, and the BLM must make changes to grazing practices to support the achievement of the BLM Utah Standards for Rangeland Health.

Alternative D is the same as Alternative B in that it also would adaptively manage the season of use, duration, and distribution of livestock grazing to meet or move toward meeting BLM Utah Rangeland Health Standards, before considering changes to the stocking rate, including the improvements of livestock distribution through range improvements, salting, supplements, or other techniques; analyzing the adjustment of the season of use, duration, and recovery periods based on monitoring data, during the permit-renewal NEPA process; providing flexibility in grazing dates; and managing for conditions rather than for the calendar year. It also requires temporarily suspending AUMs in allotments during drought years. Under Alternative D, 1,150,000 acres would be available for grazing in watersheds within allotments in GSENM and Glen Canyon (see **Table 3-38**), which is 54 percent less available acreage than under Alternative A. This reduction in available acreage would reduce any impacts grazing would have on watershed health, such as increased turbidity or sedimentation and decreased water quality.

Alternative D would be more protective of water resources than Alternative A because of the requirement to complete land health assessments.

Route designations would remain as directed under the 2000 MMP until travel management planning is complete and for routes designated for public use, future travel management would prohibit the designation of routes not included in the 2000 GSENM TMP for public use, as modified by ongoing planning processes, unless they are needed for public safety. This alternative would designate more lands as closed to cross-country OHV travel than any other alternative. Under Alternative D, 1,638,800 acres within GSENM's watersheds would be closed to OHV travel, and 226,800 acres would limit OHV travel to existing and designated routes. The RMP also requires the BLM to consider motorized, mechanized, and nonmotorized/nonmechanized route designations, and eliminate motorized and mechanized travel in areas of vulnerable soils. These restrictions would protect water resources by reducing the potential for sedimentation and erosion.

Under Alternative D, camping would only be allowed in developed campgrounds or designated camping areas. Alternative D would require the use of personal waste systems within 300 feet of water sources. Group size limits could also be adjusted to protect other resource values, including riparian areas.

Alternative D would be mostly the same as Alternative B in that it would implement landscape-scale ecosystem restoration projects to restore functional vegetation communities; however, the vegetation communities would be native, and there would be a prioritization of natural processes and techniques over other methods. Alternative D would be the same as Alternative B in that it would use wildland fire throughout GSENM. It also would be similar to Alternative B in that it would stabilize, rehabilitate, and restore landscape characteristics after wildland fires to enhance and restore native ecosystems; however, it would prioritize natural processes over other methods.

This alternative would be similar to Alternative B in that management would avoid new discretionary actions within 330 feet of riparian areas and wetlands unless topographic boundaries limit the distance; however, the management action would enhance riparian areas and wetlands, rather than result in no adverse impacts on riparian areas and wetlands. Alternative D would be the same as Alternative B in that it would prohibit discretionary actions within riparian communities associated with hanging gardens.

Cumulative Impacts

The cumulative effects analysis area for water resources is the planning area because it includes all land that would experience impacts from management decisions. The temporal analysis area is the duration of the plan. For water resources, cumulative impacts are those that affect both the surface water features and groundwater features in the planning area. Reasonably foreseeable future management actions with the potential to affect water resources include acres open to land development, including roads, other ROWs, and other infrastructure. These impacts are qualitatively discussed in terms of area open or closed to authorized OHV use or grazing allotments under all alternatives, as well as potential surface disturbance associated with different resource management strategies to water resources. These impacts are also quantitatively addressed in terms of acres of land that are open or closed to grazing allotments and OHV use.

The cumulative impacts of past and present actions on water resources in the planning area are captured in the description of the *Affected Environment*. In the Colorado Plateau ecoregion, creeks, streams, and rivers have experienced diminished instream flow and altered flow regimes created by dams, channelization, canal systems, and water diversions (Bryce et al. 2012). River flow regulation, channelization, levees, and dikes have eliminated spring flooding in some cases. Ongoing climate trends combine with and exacerbate these conditions. Past land management, including livestock grazing, has contributed to reduced water quality and quantity. Past and present actions also include watershed improvement and invasive plant removal projects, which will contribute to long-term reduction of erosion and sediment loading and improvements in water quality and quantity.

This analysis assumes that the level of demand for water resources would remain relatively stable over the life of the plan. It also assumes that water resources could be impacted by additional factors such as wildland fire, changes in vegetation, or recreation and visitor services. Additionally, future management actions or projects related to land development, mineral extraction, habitat restoration, vegetation management, development of livestock wells, and road maintenance also have the potential to impact water resources within GSENM (**Appendix F**, Analytical Framework). Specific actions that may contribute to effects on water resources in the cumulative effects analysis area include the creation and maintenance of ROWs for transmission lines (for example, Garkane Energy's Cottonwood/Cockscomb 138 kilovolt transmission line and the Buckskin to Kanab, Utah and Fredonia, Arizona transmission line), and water pipelines (Lake Powell Pipeline ROW), water development projects for livestock grazing, and vegetation and watershed restoration projects (for example, the Upper Kanab Creek Watershed EA and KFO Noxious and Invasive Vegetation Management EA).

Under all alternatives, surface-disturbing activities have the potential to create sedimentation that would travel into waterbodies in the planning area. Additionally, under all alternatives, sedimentation can be expected to be influenced by climate change and increased dry soil that is more easily eroded. For additional information related to soil erosion as a result of passive management, see **Section 3.2**, Soil Resources. Alternatives that prioritize protection and improvement of water resources, including Alternatives C and D, could have fewer contributions toward these effects than Alternatives A and B, which are generally less protective of resources and would allow for more intensive resource uses.

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3.5 NOXIOUS WEEDS AND INVASIVE, NONNATIVE PLANTS

3.5.1 Affected Environment

Current Conditions

Noxious weeds and nonnative, invasive plants disrupt or have the potential to disrupt or alter the natural ecosystem function, composition, or diversity of infested areas. These species complicate natural resource use and may interfere with management objectives.

Invasive plants are those that are not native and cause or are likely to cause harm to ecology, the economy, or human health (Executive Orders 13112 and 13751). Native plants that can become excessively abundant due to disturbance or other modification of an ecosystem are sometimes also called “invasive” (BLM Handbook H-1740-2; BLM 2008); however, these are excluded here because they typically are not problematic and are not a management focus in the decision area.

Noxious weeds are designated under federal and state noxious weed acts. No federally designated noxious weeds are known to occur in the planning area. Noxious weeds in the planning area are listed under the Utah Noxious Weed Act of 2008. This act defines “noxious weed” as “any plant the commissioner determines to be especially injurious to public health, crops, livestock, land, or other property.”

Weed spread is often influenced by the extent of disturbed soil and the proximity of established weed infestation to areas of disturbance. Assessing weed spread is based in part on evaluating the difference in frequency, intensity, or type of management activity or natural processes (such as wildfire) that result in significant soil disturbance. In addition, the mechanism for transporting weed seed is termed a “vector.” Noxious weeds have been found in a variety of locations and habitat types, with waterways and transportation systems being the major vectors of spread. Other vectors include vehicle use, wind, wildlife, livestock, and humans. Over a 6-year study in the planning area (Stohlgren et al. 2006), researchers identified the following patterns across the landscape related to invasive plants:

- Both native and nonnative plant species thrive in rare, mesic (moist) habitats that are high in soil fertility, moisture, and foliar cover.
- Highly disturbed habitats, such as post-burn areas, have exceedingly high levels of plant invasions related to the destruction of soil crusts and local displacement of native species by invasive species.
- More common xeric (dry) habitats are high in endemic species and have considerably lower nonnative species and cover.

Table 3-42 summarizes the noxious weeds documented in the planning area.

Table 3-42. Noxious Weeds in the Planning Area

Name	Weed Class ¹
Russian knapweed (<i>Acroptilon repens</i>)	3
Hoary cress or whitetop (<i>Cardaria draba</i>)	3
Poison hemlock (<i>Conium maculatum</i>)	3
Field bindweed (<i>Convolvulus arvensis</i>)	3
Bermudagrass (<i>Cynodon dactylon</i>)	3
Quackgrass (<i>Elymus repens</i>)	3
Scotch thistle (<i>Onopordum acanthium</i>)	3
Johnsongrass (<i>Sorghum halepense</i>)	3
Tamarisk or salt cedar (<i>Tamarix ramosissima</i>)	3
Leafy spurge (<i>Euphorbia esula</i>)	2
Russian olive (<i>Elaeagnus angustifolia</i>)	4

Sources: Utah Weed Control Association 2022; BLM GIS 2022

¹ Noxious Weed Class Descriptions:

1A = Not known to exist in Utah; significant risk of invasion (none known to be present in GSENM)

1B = Limited distribution in Utah; early detection, rapid response (none known to be present in GSENM)

2 = Widely distributed in Utah; considered controllable

3 = Widely distributed in Utah; considered beyond control; control expansion

4 = Present in Utah; prevent distribution through seed law

Additional weeds on the Utah Noxious Weed List (Utah Weed Control Association 2022) have been documented in the region and have the potential to become introduced in the planning area, but are not known to be there currently. These are:

- Musk thistle (*Carduus nutans*); Class 3
- Diffuse knapweed (*Centaurea diffusa*); Class 2
- Yellow star-thistle (*Centaurea solstitialis*); Class 2
- Spotted knapweed (*Centaurea stoebe*); Class 2

- Squarrose knapweed (*Centaurea virgata*); Class 2
- Canada thistle (*Cirsium arvense*); Class 3
- Houndstongue (*Cynoglossum officinale*); Class 3
- Dyer's woad (*Isatis tinctoria*); Class 2
- Perennial pepperweed or tall whitetop (*Lepidium latifolium*); Class 3
- Dalmatian toadflax (*Linaria dalmatica*); Class 2
- Purple loosestrife (*Lythrum salicaria*); Class 2

While not listed on Utah's Noxious Weed List (Utah Weed Control Association 2022), an invasive plant species of concern and a significant change agent in the region is cheatgrass (*Bromus tectorum*). Change agents alter ecosystem processes, such as fire regimes, and have the potential to expand their distribution despite human and natural disturbances. They also have the potential to adapt and shift their range in response to climate change (Bryce et al. 2012).

The BLM has inventoried portions of the decision area to determine the extent of noxious weeds and invasive plants. In 2012, the BLM inventoried more than 4,600 acres in the Alvey Wash watershed, focusing on the invasive woody riparian species Russian olive and the noxious weed tamarisk. Other targeted species were hoary cress, Russian knapweed, and perennial pepperweed, though no infestations of these species were identified. In the inventoried area, biologists detected nearly 150 acres of Russian olive and more than 200 acres of tamarisk (Edvarchuk and Ransom 2012).

Rangeland health assessments in the decision area's riparian areas between 2000 and 2003 found that tamarisk (found at 68 percent of riparian sites), the invasive plant yellow sweetclover (*Melilotus officinalis*; found at 37 percent of riparian sites), and cheatgrass (found at 32 percent of riparian sites) were common (BLM 2006). Cheatgrass was also the predominant invasive species in upland sites. It was found in 54 percent of sites assessed, and it was a dominant species in over 20 percent of those sites (BLM 2006). Yellow sweetclover is rare outside riparian areas.

Invasive annual grasses, such as cheatgrass, are known to increase fire frequency and alter ecosystems in western rangelands (Bradley, Curtis, and Fusco 2018). Cover greater than 1 percent of invasive annual grasses translates to a higher fire frequency. Annual herbaceous cover in GSENM is presented in **Table 3-15** and **Figure 3-16** (Mean Annual Forb/Grass Cover), **Appendix A**, based on data from the Rangeland Analysis Platform. Over 55 percent of GSENM has a 1 percent or higher percent cover of herbaceous annuals; these put GSENM at a high risk of catastrophic fire (**Table 3-15**, Annual Herbaceous Cover in the Planning Area). **Figure 3-20** (Annual Forbs/Grass Cover Change) in **Appendix A** shows the trend of annual grass and forb cover across GSENM and the intersecting watersheds. Areas shown in red are where annual grass and forb cover have significantly increased from 1996 to 2021; areas shown in blue are where annual grass and forb cover have significantly decreased since 1996.

According to AIM data, the most abundant invasive annual grass is cheatgrass, which was documented in 159 out of 405 AIM and landscape monitoring framework plots (39 percent) and shows a wide distribution across GSENM. Three other invasive annual grasses have been recorded in GSENM: red brome (*Bromus rubens*) at 26 plots, field brome (*Bromus arvensis*) at 1 plot, and annual wheatgrass (*Eremopyrum triticeum*) at 1 plot. The majority of the remaining invasive plant records from AIM and landscape monitoring framework plots are invasive annual forbs, including Russian thistle (*Salsola tragus* at 43 plots), herb sophia

(*Descurainia sophia* at 17 plots), redstem filaree (*Erodium cicutarium* at 16 plots), and saltlover (*Halogeton glomeratus* at 12 plots).

Reductions in biological soil crust cover, native perennial herbaceous cover, and native species richness increase the risk of cheatgrass invasion in multiple ecosystems in the Intermountain West (Reisner et al. 2013; Root et al. 2020; Roundy et al. 2018; Shinneman and Baker 2009). In pinyon-juniper ecosystems of GSENM, biological soil crust cover is lower in sites grazed by livestock (Guenther et al. 2004; Harris et al. 2003). Livestock grazing is associated with decreased biological soil crust and perennial grass cover and increases in cheatgrass in Colorado Plateau salt deserts (Duniway et al. 2018). Across ecosystems in GSENM, nonnative species richness is higher where biological soil crusts are less well developed (Stohlgren et al. 2005). Increases in cheatgrass cover are also associated with fire (Evangelista et al. 2004; Shinneman and Baker 2009) and with vegetation management actions that reduce shrub or tree cover (Havrilla et al. 2017; Prevéy et al. 2010; Redmond et al. 2014; Roundy et al. 2018). For these reasons, in GSENM, livestock grazing and vegetation management can increase the risk of cheatgrass invasion and to amplify the post-fire risk of invasion.

Trends

As ground disturbance associated with human visitation increases in areas of known populations, the likelihood that noxious weeds and invasive plants would move into disturbed areas also increases due to increased vectors of weed spread. Other sources of potential noxious weed and invasive plant infestations are livestock grazing and routine GSENM operations, such as road maintenance, fire response, and even weed-control operations that result in ground disturbance.

Some successes have occurred in controlling certain species in specific areas; if such efforts are expanded, noxious invaders could be controlled somewhat. However, most of the decision area has not been inventoried for this type of effort to begin. Focused efforts include spot treatments of noxious weeds, preemergent herbicide application prior to seeding (targeting cheatgrass), harrowing and seeding, prescribed fire use, and follow-up seeding after treatment.

Forecasts

Established weed populations will likely continue to expand, and new weed species will continue to appear in the planning area because of natural and human-caused introductions. The Colorado Plateau Rapid Ecoregional Assessment (Bryce et al. 2012) predicted an 85 percent increase in invasive species distribution within the region (which includes the decision area) by 2025. The degree to which these species spread is directly correlated to human activities, disturbances, and control efforts. Surface-disturbing activities and vehicular travel contribute to weed proliferation, although natural elements, such as climate, wind, and wildlife, will likely also continue to contribute. Range animals, such as livestock and feral and domesticated horses, will also increase the opportunities for invasive plant species to spread and become established. Noxious weeds and invasive plants will be more likely to establish in newly disturbed areas, especially near existing populations. In some areas, control efforts will eradicate species locally.

Invasive annual species, such as cheatgrass, will continue to alter fire regimes by facilitating increases in fire frequency and size. This will occur due to increasing fine fuel loads and continuity in areas that were once fuel limited. As fires burn these areas, cheatgrass will replace native vegetation, reinforcing this feedback cycle. In the absence of active management responses to fire (for example, seeding and mechanical planting), cheatgrass will dominate. Pyke et al. (2013) found that post-fire seeding alone had

no effect in reducing invasive species in 67 percent of cases; however, it did reduce invasive species in 28 percent of cases studies.

While it is difficult to predict future introductions of noxious weeds and invasive species, the most likely areas for introduction are those where new disturbances occur, particularly in areas where management actions are not implemented after the disturbance. Historical evidence indicates that new weed species introduced to the planning area will establish if they are not eradicated quickly.

Control of noxious weeds and invasive plants would depend on the cost and feasibility of available treatment methods. Under the Programmatic Noxious Weed and Invasive Plant Management Environmental Assessment for GSENM (BLM 2015), resource management strategies are in place that would contribute to maintaining current levels or reducing the expansion of these species. Examples of these strategies are minimizing surface disturbance and surface-disturbing activities, reclamation of these disturbed areas, reducing traffic through infested areas, and requiring equipment to be washed prior to and after completion of work. Research continues to develop new herbicide formulations and test the effectiveness of biological agents, including pathogens, as tools to control weed species.

3.5.2 Environmental Consequences

Refer to **Section F.10**, Noxious Weeds and Invasive, Nonnative Plants, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed vegetation management and land use allocations affect noxious and invasive, nonnative plants?

Impacts Common to All Alternatives

As described in the affected environment (**Section 3.5.1**), weed spread is often influenced by the extent of disturbed soil and the proximity of established weed infestation to areas of disturbance. Assessing weed spread is based in part on evaluating the difference in frequency, intensity, or type of management activity or natural processes (such as wildfire) that result in significant soil disturbance.

Ground-disturbing vegetation management would increase the risk of noxious and invasive, nonnative species establishment and spread by increasing surface disturbance and vectors of weed spread. See **Section 3.3.2**, Vegetation, *Impacts Common to All Alternatives* for a description of how different vegetation management impact noxious and invasive, nonnative species establishment and spread. BMPs, identified in **Appendix C**, used under all alternatives to prevent the introduction of noxious and invasive, nonnative plants in accordance with local weed program monitoring protocols would reduce or prevent these impacts.

In the long term, vegetation management would increase vegetation function and resilience by facilitating native shrub and perennial grass and forb cover (Miller et al. 2000) and by increasing resistance to invasive annual grass invasion (Tausch et al. 2009).

Recreation, including OHV use, increases the vectors for weed spread. Invasive, nonnative plant materials can be introduced by recreationists' vehicle tires or undercarriages or on the footwear or clothing of

recreationists. These risks are highest around developed campgrounds, in heavily used dispersed areas, and along motorized routes, trails, and trailheads. The probability that noxious and invasive, nonnative plants will successfully establish depends primarily on several factors, including plant propagule pressure and surface disturbance. The more propagules that are introduced, the more likely that nonnative plants will eventually become established (Von Holle and Simberloff 2005). Where recreation is managed using an SRMA or ERMA on BLM-managed lands, impacts from recreation could be concentrated in one area; however, this could prevent impacts from dispersed recreation elsewhere in GSENM. Further, rules and guidelines in SRMAs and ERMAs would limit or control activities through specialized management tools, such as designated campsites, permits, area closures, and limitations on the number of users, duration of use, and types of events.

Grazing can also increase susceptibility for the introduction and spread of noxious and invasive weeds by degrading the native grass community and creating ground disturbance from the livestock themselves and from maintenance of associated infrastructure. As described in the affected environment (**Section 3.5.1**), livestock grazing is associated with decreased biological soil crust and perennial grass cover and corresponding increases in invasive annual grasses (Duniway et al. 2018). Livestock movement and associated activities, such as the transport of contaminated hay, can also introduce noxious and invasive weeds into new locations. However, all alternatives include management direction to mitigate the risks of these impacts and to emphasize sustainable, healthy rangelands with respect to grazing practices.

Areas identified as avoidance or exclusion for ROWs would reduce the risk of the introduction and spread of noxious and invasive weeds. ROW exclusion areas would reduce this risk to a greater extent than avoidance areas because they would completely prohibit surface-disturbing activities. Limiting vehicle use to existing or designated routes would also reduce the vectors of weed spread across GSENM.

Alternative A

Under Alternative A, current management of terrestrial vegetation would continue under the 2020 Approved RMPs. The condition and trends for noxious weeds and nonnative, invasive species, as summarized in the affected environment (**Section 3.5.1**), would be expected to continue along similar trajectories. The increasing risk of uncharacteristic wildfire due to increasing invasive annual grass cover and fine fuel loads would continue and lead to further invasions and reduced ecological resilience, particularly in the face of climate change and increased drought. Vegetation management, where implemented, would help reduce these risks and help move vegetation conditions toward desired conditions, which includes a reduction in noxious weeds and nonnative, invasive species. Vegetation management under Alternative A would continue focusing on active restoration projects to increase vegetation community resiliency. This would help maintain the extent and function of vegetation communities in the longer term as climate trends become more pronounced. It would also help reduce the introduction and spread of noxious and nonnative, invasive species by increasing biodiversity and resiliency of native vegetation communities. Because vegetation removal and surface disturbance would occur, short-term impacts could occur. As described under *Impacts Common to All Alternatives*, the type of impact and intensity would vary based on the treatment type. The BLM would manage invasive, nonnative plants in accordance with local weed program monitoring protocol, which would reduce or prevent these impacts.

Alternative A would provide the most acreage (2,116,200 acres) and AUMs for livestock grazing across all alternatives. In these areas, noxious weeds and invasive, nonnative species would likely continue to establish and spread, as described under *Impacts Common to All Alternatives*.

Recreational use is likely to continue to increase within GSENM, which will also increase the potential for noxious weeds and invasive, nonnative species' introduction and spread. Managing 2,800 acres as closed to OHV travel would preclude motorized travel effects on the introduction and spread of noxious and invasive, nonnative species. However, these effects would still be expected to occur alongside existing and designated routes and in areas open to OHV travel.

The BLM would continue to manage approximately 1,865,600 acres as ERMAs, SRMAs, and RMZs. These designations could concentrate impacts from recreation in these areas; however, the rules and guidelines associated with RMAs are designed to reduce recreation's impacts, including noxious weeds and invasive, nonnative species, on all GSENM objects.

Under Alternative A, the BLM would continue to manage 881,300 acres as ROW exclusion areas. The introduction and spread of noxious weeds and nonnative, invasive species would continue to be reduced in these areas by reducing surface-disturbing activities that increase the introduction and spread of these species, as described under *Impacts Common to All Alternatives*. Alternative A would contain the largest amount of acres open to ROW authorization (630,400 acres); therefore, continued introduction and spread would still be expected to occur in these areas.

Alternative B

Vegetation management under Alternative B would be the same as under Alternative A.

Additionally, this alternative includes management direction to complete land health assessments and causal factor determinations within eight departed watersheds across GSENM within 2 years of signing the ROD. Based on the causal factor determinations, and within 5 years of the signing of the ROD, the BLM would take appropriate actions that would result in significant progress toward fulfillment of the land health standards. This would ensure vegetation management would be carried out in these departed watersheds and that no large-scale impacts from discretionary uses would occur.

Under Alternative B, in addition to the allotments that are unavailable under Alternative A, allotments that do not have a current grazing permit would become unavailable for livestock grazing. This would add approximately 78,900 acres as unavailable for grazing and reduce AUMs by 2,961. This would reduce the risk of noxious and invasive species' establishment and spread in these areas by reducing the vectors of weed spread and disturbance pathways to a greater extent than Alternative A.

Under Alternative B, the BLM would close the only OHV open area that would be open under Alternative A, 100 acres within the Little Desert RMZ. This closure would reduce the potential for the introduction and spread of noxious and nonnative, invasive species. Alternative B would also close approximately 950,200 additional acres where OHV use would be limited to designated routes under Alternative A. Closing areas where OHV travel was previously limited to designated routes would reduce vehicular travel on designated routes and therefore reduce the potential for the introduction and spread of noxious and nonnative, invasive species in these areas.

Under Alternative B, approximately 1,770,100 acres would be designated as ERMA with only a small increase in SRMA acreage compared with Alternative A (from 67,600 to 95,300 acres). Since the acres and management of RMAs would be similar under both alternatives, it is expected that impacts on noxious and nonnative, invasive species from the designation of RMAs under Alternative B would be similar to those described under Alternative A.

The number of acres that would be managed as ROW exclusion areas is similar to the amount under Alternative A; therefore, the reduction in noxious and nonnative, invasive species' introduction and spread from restricting ROW development would be similar to that under Alternative A. However, the number of acres that would be open to ROW authorization would be greatly reduced under Alternative B compared with Alternative A (85,100 acres compared with 630,400 acres). Compared with Alternative A, this would result in a significant reduction in the potential for noxious and nonnative, invasive species' introduction and spread by restricting the potential for ROW development in these areas.

Alternative C

Effects from vegetation management would be similar to those described under Alternative A. However, Alternative C would use an area management approach where the front country, passage, and outback areas would focus on proactive management, while the primitive area would focus on natural processes. Proactive management in the front country, passage, and outback areas would help move vegetation toward desired conditions, which include a reduction in noxious and nonnative, invasive species, at a faster rate than natural processes. The relative speed and efficacy of movement toward desired conditions would vary depending on the treatment method or combination of treatment methods, as described above in the *Impacts Common to All Alternatives*.

Areas where vegetation has been degraded by invasive annual grass expansion, fire suppression, or excessive livestock grazing may not be able to return to their previous state, or desired conditions, without active management (Briske et al. 2006). Therefore, reducing noxious and nonnative, invasive species in the primitive area may not be achievable under this alternative; this could lead to less resilient vegetation in these areas.

Under Alternative C, in addition to the allotments that would be unavailable under Alternatives A and B, allotments within Glen Canyon would also be unavailable to reduce conflict with recreation and protect riparian resources. This would add approximately 189,200 acres as unavailable for grazing and reduce AUMs by 10,538. This would reduce the risk of noxious and invasive species' introduction and spread in these areas by reducing the vectors of weed spread and disturbance pathways to a greater extent than Alternative A. However, this reduction in acres is outside the GSENM boundary; therefore, the impacts from grazing on noxious and invasive species' introduction and spread within GSENM would be the same as under Alternative B.

Alternative C would close the only OHV open area that would be open under Alternative A, 100 acres within the Little Desert RMZ. This closure would reduce the potential for the introduction and spread of noxious and nonnative, invasive species. Alternative C would also close 1,209,900 acres to OHV use, and OHV use would be limited to designated routes on 655,700 acres. Within the areas closed to OHV use, approximately 7 miles of routes would be closed (BLM GIS 2022). Closing these routes and areas where OHV travel was previously limited to designated routes would reduce vehicular travel on designated

routes; therefore, this would reduce the potential for the introduction and spread of noxious and nonnative, invasive species in these areas to a greater degree than under Alternative A.

Under Alternative C, approximately 486,300 acres would be designated as ERMAs and 417,400 as SRMAs. With fewer acres managed as RMAs, there would be fewer restrictions on recreation, which would increase the potential that larger group sizes, less restrictions on camping and campfires, and the development of facilities could lead to an increase in the degradation of vegetation communities; this would result in vegetation communities that are more susceptible to invasion of noxious and nonnative, invasive species than Alternative A. In general, management for the front country and passage areas would be less limiting while the outback and primitive areas would have more restrictions. These restrictions in the outback and primitive areas would reduce impacts that recreation would have on noxious and nonnative, invasive species.

Under Alternative C, the BLM would manage 1,188,600 acres as ROW exclusion areas; this is 307,300 acres more than under Alternative A. This increase in ROW exclusion areas would reduce the potential for the introduction and spread of noxious and nonnative, invasive species to a greater degree than under Alternative A. The number of acres that would be open to ROW authorization would also be greatly reduced under this alternative compared with Alternative A (10,900 acres compared with 630,400 acres). Compared with Alternative A, this would result in a significant reduction in the potential for noxious and nonnative, invasive species' introduction and spread by restricting the potential for ROW development in these areas.

Alternative D

Vegetation management under Alternative D would prioritize natural processes and techniques, compared with active restoration under Alternative A. Such means are largely hands off and would result in less restorative changes in vegetation than the Alternatives B and C. This alternative would also preclude using prescribed fire in many areas because prescribed fire likely cannot be used without mechanical pretreatments in much of GSENM. The prioritization of natural processes would likely reduce the number of restoration projects that use active management and rely on passive management. Limiting active management would reduce the short-term direct impacts those projects would have on noxious and nonnative, invasive species, such as increased vectors of weed spread and increased surface disturbance, as described under *Impacts Common to All Alternatives*.

However, the reduction in these projects could also increase the spread of noxious and nonnative, invasive species in the long term. The reliance on passive management could increase the establishment of noxious and invasive species if certain tools and techniques were not authorized to be used. Studies have shown that in some circumstances, such as after wildfire, using passive restoration can lead to high levels of woody fuels that can lead to unnaturally high-intensity fires that can cause more severe damage to vegetation communities, compared with natural fire regimes (Forest Service 2022). Additionally, the reliance on natural processes could lead to restoration projects requiring a longer time to achieve desired conditions compared with active management. In some cases, such as in areas that have been degraded by invasive annual grasses, fire suppression, or excessive livestock grazing, desired conditions for vegetation may not be able to be met without active management (Briske et al. 2006).

Restricting revegetation to native plant materials could increase the cover of native species in project areas, increasing plant community diversity, structure, and function and resistance to invasion. In some

situations, however, native species may not compete well in areas with invasive annual grasses (Miller et al. 2015) or nonnative perennial grasses. Revegetation with native plant materials in these areas without pre- and/or post-chemical treatments of invasive annual grasses and nonnative perennial grasses would likely result in the treatment area being reinvaded by these species, or it would require the use of more invasive mechanical methods such as tilling. This would increase the necessity for multiple treatments and slow the movement toward desired conditions where treatments were done. Vegetation communities without invasive annual grasses as a component of the plant community and buffered from areas where invasive annual grasses occur would be optimal for manual or mechanical planting treatments. Augmentation with native plant material would provide the opportunity to increase the plant communities' resistance and resilience by increasing diversity, structure and function, vigor, and overall health.

Alternative D also includes the management direction to complete land health assessments and, if needed, causal factor determinations across GSENM within 10 years of signing the ROD. This would help ensure that land health standards and movement toward desired conditions for noxious and nonnative, invasive species are being met to a greater extent than under Alternative A, which includes no such direction.

Under Alternative D, in addition to the allotments that are unavailable under Alternative A, allotments within departed watersheds would be unavailable for livestock grazing. This would add 966,200 acres as unavailable for grazing and reduce AUMs by 62,747 (**Table 2-1**). This would reduce the risk of noxious and invasive species' introduction and spread in these areas by reducing the vectors of weed spread and disturbance pathways to a greater extent than under Alternative A.

Alternative D would close approximately 1,638,800 acres to OHV use, and OHV use would be limited to designated routes on 226,800 acres. Closing these routes and areas where OHV travel was previously limited to designated routes would reduce vehicular travel on designated routes; this would reduce the potential for the introduction and spread of noxious and nonnative, invasive species in these areas to a greater degree than under Alternative A.

Under Alternative D, approximately 251,200 acres would be designated as ERMAs and 161,000 acres as SRMAs. With fewer restrictions on recreation, there would be the potential that larger group sizes, less restrictions on camping and campfires, and the development of facilities could lead to an increase in the degradation of vegetation communities; this would result in vegetation communities that are more susceptible to invasion of noxious and nonnative, invasive species than under Alternative A.

Under Alternative D, the BLM would manage 1,693,700 acres as ROW exclusion areas; this is 812,400 acres more than under Alternative A. This increase in ROW exclusion areas would reduce the potential for the introduction and spread of noxious and nonnative, invasive species to a greater degree than under Alternative A. The number of acres that would be open to ROW authorization would also be greatly reduced under Alternative D, compared with Alternative A (2,300 acres compared with 630,400 acres). Compared with Alternative A, this would result in a significant reduction in the potential for noxious and nonnative, invasive species' introduction and spread by restricting the potential for ROW development in these areas.

Cumulative Impacts

BLM-managed, Forest Service-managed, NPS-managed, and adjacent state, tribal, county, and privately owned land surrounding GSENM are considered to be the cumulative effects analysis area for noxious

weeds and nonnative, invasive species. Ongoing and planned actions in and near GSENM would influence noxious weeds and nonnative, invasive species' conditions and management effectiveness on a regional scale. The time frame for cumulative environmental consequences for future actions is 20 years.

Portions of GSENM adjoin other BLM-managed lands, National Forest System lands, national parks, and national recreation areas, each has its own land management plan guiding noxious weeds and nonnative, invasive species management in the administrative area. Noxious weeds and nonnative, invasive species management is becoming more broadly consistent across federal land ownerships, due to updated plan adherence with current federal law, regulation, and policy. Direction for noxious weeds and nonnative, invasive species management in the adjacent agency land management plans is complementary to the proposed plan components for GSENM. This means broad movement toward reducing or eradicating noxious weeds and nonnative, invasive species would be facilitated across administrative boundaries in this region.

The cumulative impacts of past and present actions on noxious weeds and nonnative, invasive species in the planning area are captured in the description of the affected environment (see **Section 3.5.1**). Primarily, these include frequent, lower-intensity fire prior to Euro-American contact, followed by livestock grazing and fire suppression after Euro-American contact. Fire suppression includes policies established in the early 1900s and carried forward in other forest and land management plans and other state and local policies throughout the broader landscape; these policies have resulted in current vegetation conditions that are departed from historical conditions. This has resulted in a landscape with increased invasive annual grasses and a greater potential for uncharacteristically large, severe fires compared with historical conditions. Ongoing climate trends, including more frequent extreme fire weather, combine with and exacerbate these conditions.

The importance of noxious weeds and nonnative, invasive species management, including fuels treatments, wildland fire management, and managing for wildlife habitat, is widely recognized by state and federal agencies, adjacent landowners, and the general public. Actions taken outside GSENM include federally and state-funded hazardous fuel reduction projects on National Forest System and BLM-managed lands, which generally aim to move vegetation conditions and fuel loading toward historical conditions and restore historical fire regimes. The KFO Noxious and Invasive Vegetation Management Environmental Assessment would continue to guide weed management on lands bordering GSENM; therefore, it would have the potential to reduce weeds coming onto GSENM.

Other vegetation management projects in the cumulative effects analysis area include the Upper Kanab Creek Watershed Environmental Assessment and Color Country vegetation management Environmental Assessment. Additional renewable energy and other ROW projects are in the cumulative effects analysis area, including industrial-scale solar energy development on State of Utah School and Institutional Trust Lands Administration lands near Big Water. Other relevant activities include recreation, such as camping and campfire use or OHV use, and continued livestock grazing that could affect the condition of noxious weeds and nonnative, invasive species within the cumulative effects analysis area.

Also, nonfederal land management policies are likely to continue affecting noxious weeds and nonnative, invasive species management around GSENM. The cumulative effects across the large, geographically complex, and diverse cumulative analysis area are difficult to analyze, considering the uncertainties associated with government and private actions, and ongoing changes to the region's economy; however,

based on the trends identified in this section, cumulative effects, including increases in recreation, ongoing livestock grazing, and continued housing and commercial development, are likely to continue or increase.

Reasonably foreseeable future actions in GSENM have the potential to impact noxious weeds and nonnative, invasive species; these are generally projects that would substantially increase surface disturbance or increase vectors of weed spread. Projects that are anticipated to alter vegetation conditions include the Skutumpah Terrace Greater Sage-grouse Habitat Restoration Projects and post-fire restoration projects. Projects that may increase the potential for increased invasive weed spread are ROW development projects, including the Newer Garkane Transmission ROW (Buckskin to Fredonia Powerline), the Garkane Transmission ROW, and Lake Powell Pipeline ROW.

Proposed vegetation management activities, including managing for noxious weeds and nonnative, invasive species, under the alternatives would contribute to the cumulative effects of regional vegetation management by other agencies and stakeholders. These efforts would contribute to landscape restoration and ecological resilience on a larger scale, with a focus on achieving desired vegetation conditions, restoring more natural fire regimes, and reducing the potential for uncharacteristically large and severe fires; all of these would, in turn, increase resistance to invasive species. The alternatives that prioritize active vegetation and fuels management with a full range of treatment options, including Alternatives A, B, and C, could have greater contributions toward these effects than Alternative D, which emphasizes passive management and more limited treatment options.

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3.6 CULTURAL RESOURCES

3.6.1 Affected Environment

Current Conditions

Cultural resources are locations of human activity, occupation, or use that contain materials, structures, or landscapes that were used, built, or modified by people. Cultural resources include archaeological sites, buildings, structures, objects, districts, and locations associated with cultural practices or beliefs of contemporary communities.

NEPA requires a consideration of "important historic, cultural, and natural aspects of our natural heritage." (Sec. 101 [42 USC § 4331]). This includes the necessity of independent compliance with the applicable procedures and requirements of other federal and state laws, regulations, and executive orders. The principal federal law addressing cultural resources is the National Historic Preservation Act, as amended (54 USC 300101 et seq.) and its implementing regulations found at 36 CFR 800.3. These regulations, commonly referred to as the Section 106 process, describe the procedures for identifying and

evaluating historic properties, for assessing the impacts of federal actions on historic properties, and for project proponents consulting with appropriate agencies to avoid, reduce, or minimize adverse effects. Historic properties are cultural resources over 50 years old that meet specific criteria for listing on the National Register.

A subset of these cultural resources are archaeological resources, which are areas where prehistoric or historic activity altered the earth or where deposits of physical remains are discovered. Prehistoric archaeological resources are those materials deposited or left behind before the general Historic period (the time recorded by Euro-American history in Utah). Historic archaeological resources are those materials deposited or left behind during the general Historic period.

This section briefly discusses both prehistoric and historic resources in and around GSENM. Southern Utah contains one of the richest records of prehistoric archaeology in the United States. The record is dominated by the remains of cultural material from Ancestral Puebloans (Virgin Branch) and Fremont People, although previous occupation by “preceramic” foragers and farmers is abundant. The area also shows considerable evidence of occupation by ethnohistoric and historic peoples in the subsequent centuries. These cultures are broken down into four broad prehistoric periods in the GSENM area (Spangler and Zweifel 2021): the Paleoarchaic (10,000–8000 BC), the Archaic (8000–1000 BC), the Formative (500 BC–AD 1300), and the Late Prehistoric (AD 1300–1775). These periods are then followed by the Historic period (after AD 1776).¹⁶ A more detailed cultural history of the area, reviewed in the Grand Staircase-Escalante National Monument AMS (5-44-5-54), is incorporated by reference.

The Paleoarchaic and Archaic archaeological record in GSENM typically consists of isolated projectile points, features, or artifact scatters and kill sites; petroglyphs; and small, open campsites. The Formative period in southern Utah is represented by Ancestral Puebloan (Virgin Branch) and Fremont occupations marked by a trend toward seasonal sedentism until settlement in small villages or hamlets, and later in larger communities. The Ancestral Puebloan occupations include the Basketmaker II/Early Agricultural, Basketmaker III, Pueblo I, Pueblo II, and Pueblo III periods. Notable Pueblo I sites have been identified in GSENM and the vicinity in Seaman Wash, Shinarump Bench, and Johnson Canyon in the Grand Staircase region; on Harris Mountain, Pipe Springs, and Yellowstone Mesa on the Arizona Strip; and on Little Creek Mountain above the upper Virgin River and its tributaries. Early Pueblo II sites are found in most northern Grand Staircase environmental settings. Trail Canyon Alcove and a site along Parunuweap Canyon are key late Pueblo II archaeological manifestations. In and around GSENM, the Pueblo III period is relatively poorly understood.

Fremont open site types found in GSENM include summer camps, both upland and lowland field camps, and task-specific foraging camps. Fremont architectural sites include pit houses—typically found in valleys—and seasonal residences in nearly all geographies. A common Fremont site type used specifically for storage of goods consists of semi-subterranean storage cists and aboveground granaries. Some granary locations are high on cliff faces. Storage sites are found widely across the GSENM area.

¹⁶ In this chapter, dates in years before present (BP) and also with calendrical dates using BC and AD are provided for the Paleoindian and Archaic periods, while calendrical dates using BC and AD are used for the Formative, Late Prehistoric, and Historic periods. The Late Prehistoric period ended when Euro-American explorers and settlers arrived in the region, which marks the beginning of the Historic period.

Several areas of GSENM have significant concentrations of Ancestral Puebloan and Fremont resources, including the Circle Cliffs, Hackberry Canyon, and Buckskin Mountain areas. The Upper Escalante Canyons contain a high density of Fremont pithouses, villages, and storage cists, and the canyons feature numerous petroglyphs, pictographs, and inscriptions of multiple periods. Fiftymile Mountain, in the eastern portion of the Kaiparowits Plateau, features a high density of masonry structures with architectural styles indicating the convergence of Ancestral Puebloans and Fremont cultures. Alvey Wash, in the northern portion of the Kaiparowits Plateau, includes multiple cliffside storage structures, pithouses, petroglyphs, pictographs, and inscriptions; it may have been an important travel route between the Escalante River and the plateau. The Grand Staircase area includes Ancestral Puebloan sites with some of the earliest evidence of maize agricultural in the region.

The Late Prehistoric period's archaeology is sparse in the GSENM area, and occupation by Puebloan groups after the abandonment in the late thirteenth century cannot be demonstrated archaeologically (Spangler et al. 2010, 137); however, it is during this time that modern-day groups, such as the Utes, Paiutes, and Navajo, began to utilize the area. Sites from this period typically consist of sparse lithic scatters with low quantities of brown-ware ceramics, petroglyphs, and occasionally characteristic wickiup remains. Areas in GSENM with significant occurrences of resources from this period include Fiftymile Mountain, the Grand Staircase, and the petroglyphs, pictographs, and inscriptions in the Upper Escalante Canyons.

European and Euro-American explorers entered the area as early as 1776 with the expedition of Father Francisco Atanasio Domingues and Silvestre Velez de Escalante. More sustained Euro-American settlement resulted from groups of Church of Jesus Christ of Latter-day Saints (Mormon) pioneers entering the area beginning in 1847 and U.S. Government expeditions into the region in the 1850s. The movement of Euro-American settlers into Native American lands caused conflicts that coalesced into the Black Hawk War in the 1860s that eventually concluded with a peace treaty in 1868, although some raids continued until 1872.

Early Euro-American cultural resources in GSENM include several trails such as the Burr Trail in Circle Cliffs, Boulder Mail Trail in the Upper Escalante Canyons, and the Hole-in-the-Rock Road, discussed in more detail below. Early pioneer sites, including cabins, fences, and stock trails, are in Fiftymile Mountain and Hackberry Canyon, which includes the Watson Cabin, one of the rare extant pioneer structures in the region. Important Church of Jesus Christ of Latter-day Saints sites are also present, including Dance Hall Rock southeast of the Upper Escalante Canyons, and Paria ghost town in the Upper Paria River area.

Coal, gold, and antimony mining began in the area in the late nineteenth century along the Colorado River. This mining largely ended with the onset of the Great Depression in the 1930s. As part of the federal government's New Deal aid package, Civilian Conservation Corps camps in GSENM were instrumental in making range improvements and building the first Escalante-to-Boulder road.

The lumber industry increased in importance during the post-World War II period, as lumber companies and sawmills were established in Escalante, Hatch, and Panguitch in Garfield County, and on the Kaibab Plateau and at Fredonia, south of GSENM in Coconino County, Arizona. Uranium mining was also profitable in the region. Most recently, tourism at destinations, including Bryce Canyon National Park, Zion National Park, and GSENM, has become a key component of regional development.

Archaeological investigations prior to the designation of GSENM were concentrated in the Grand Staircase region, with relatively few studies conducted in the Escalante River Basin and Kaiparowits Plateau

areas. Some of the first ethnographic descriptions of the Native peoples in the area occurred as early as 1776 by Spanish friars. Early observations of the archaeological sites in the area occurred during explorations of the Colorado River in 1869. Early excavations in the region date back to work in the 1870s in the Johnson Canyon area.

Archaeological excavations continued sporadically from the 1910s, with a concentration of government- and university-sponsored investigations in the 1920s and 30s. These include work by Julien Steward within what would become GSENM that sought to understand regional variation of Pueblo-like cultures north and west of the Colorado River. In the 1950s and 60s, the University of Utah and Museum of Northern Arizona conducted 6 years of research for the Glen Canyon Project prior to the inundation of Lake Powell (Spangle et al. 2019, 91–92). Cultural resource compliance projects since GSENM was designated in 1998 have included over 36,000 acres and 33 miles of river corridor as of 2019 (Spangler et al. 2019, 116), documenting over 1,500 sites.

Based on data from GSENM (BLM GIS 2022), 4,676 cultural resources are currently documented within the decision area; these cover a total area of 12,773 acres. These include 1 National Register-listed site, 1,847 sites that have been determined eligible for the National Register, 611 sites that have been determined not eligible for the National Register, 757 sites that have not been evaluated, and an additional 1,460 sites that do not have National Register eligibility status and should also be considered not evaluated for the National Register (**Table 3-43**). Portions of the historic Hole-in-the-Rock Trail pass through GSENM. This trail was built in 1879 and 1880 by members of the Church of Jesus Christ of Latter-day Saints who were seeking to establish a new settlement on the banks of the San Juan River in today’s San Juan County (NPS 2022). The trail is approximately 160 miles long, beginning near Escalante and crossing GSENM as it continues toward its terminus near Bluff. This trail was listed on the National Register in 1982. Recently, NPS (Glen Canyon) and BLM completed an ethnographic study of the traditional uses of the trail. Currently, the NPS (Glen Canyon) and BLM are nominating this historic property as a traditional cultural property to the National Register, and the site is both a Public Use and Traditional Use site.

Table 3-43. Cultural Resources in the Decision Area by National Register Status

National Register Status	Count	Acres
Listed	1	1
Eligible	1,847	5,799
Not eligible	611	994
Undetermined	757	637
No data	1,460	5,343
Total	4,676	12,774

Source: BLM GIS 2022

Additional cultural resources are located within approximately 90,200 acres of BLM-managed livestock grazing allotments that extend into the adjacent Glen Canyon National Recreation Area, including all or portions of the following allotments: Big Bowns Bench, Escalante River, Fortymile Ridge, Harveys Fear, Lake, Lake Powell, Last Chance, Lower Cattle, Lower Warm Creek Moody, Navajo Bench, Nipple Bench, Rock Creek-Mudholes, Soda, Spencer-Bench, Upper Cattle, Upper Warm Creek, Wagon Box Mesa, and Wire Grass (see **Table 3-83** in **Section 3.16.1**). Comprehensive cultural resource data from sites outside GSENM are not included in the calculations presented in **Table 3-43**, **Table 3-45**, or **Table 3-47**. However, several grazing allotments in Glen Canyon are notable for cultural resources presence

and significance spanning over approximately 8,000 years of history; these include Fortymile Ridge, Lake, Soda, and Rock Creek-Mudholes.

While no portions of the OSNHT within GSENM have been formally listed on the National Register, the OSNHT was designated by the Old Spanish Trail Recognition Act of 2002. It is a 2,700-mile-long trade route extending from Santa Fe, New Mexico, to Los Angeles, California. It passes through Colorado, Utah, Arizona, and Nevada. The trail splits into three routes prior to entering Utah and continues through Utah within the planning area. In 2016, the NPS and BLM, as co-managers, published the OSNHT Final Comprehensive Administrative Strategy (BLM and NPS 2016) detailing procedures for this trail. There are 36 miles of the Armijo Route, a segment of the OSNHT, within the decision area (**Figure 3-28**, Scenic Routes, in **Appendix A**). See **Section 3.20.2**, National Trails, for a further discussion of the OSNHT.

In 2018, the University of Utah Archaeological Center developed a cultural resources predictive model for GSENM (Yaworsky et al. 2018). The model statistically evaluated the relationships between known site locations and environmental variables to predict the likely occurrence of cultural resources across GSENM. The model was developed by dividing model runs into separate time periods and combined time periods of sites to evaluate the change in site location over time. The final product is an overlay of the various time period models, taking the highest value from any of the models within any given 5-square meter location. The resulting model values range from 0.0 to 1.0 and can be interpreted as the percent probability that an archaeological site of any time period is present within the 5-square meter area. In application, the BLM considers any value of 0.6 or greater to be high probability for archaeological resources.¹⁷ **Table 3-44** shows there are 491,600 acres of high-probability areas within the decision area. These acreages do not include BLM-managed livestock grazing allotments within Glen Canyon.

Table 3-44. Cultural Resources Predictive Model Classification Acreage in the Decision Area

Predictive Model Classification	Acres (rounded)
High probability	491,600
Low probability	1,388,800
Total	1,880,400

Source: BLM GIS 2022

Trends

Under current management, long-term observations and specific site monitoring suggest that cultural resources are in a relatively stable condition. These observations are possible because the BLM GSENM has had a site monitoring component in its cultural resource program since GSENM’s inception. Also, for more than a decade, it has had an active site steward program. Administrative management of the site steward program has recently been transferred to the Utah State Historic Preservation Office to benefit from increased training opportunities and to improve statewide monitoring consistency.

Looting of cultural resource sites is rare. Vandalism does occur, such as graffiti of archaeological sites (such as petroglyph panels) and is expected to increase with greater visitation to GSENM. The casual collection of artifacts and historic objects continues to be a problem; however, this is actively addressed

¹⁷ Sandra Sarzycka, BLM Archaeologist, Grand-Staircase-Escalante National Monument, personal communication with Luke Hodges, EMPSi, on February 7, 2023, regarding Predictive Model for GSENM Cultural Resources.

by public education efforts. Current observations suggest that looting has tapered off in recent years largely due to public education and law enforcement efforts.

Increased visitation and recreation have caused impacts on cultural resources. The reasons for this likely include ease of access and increases in the number of visitors who can access cultural resource localities. Additional factors contributing to impacts on cultural resources from visitation and recreation include publication of site locations on social media; unintentional effects from visitor use, such as camping in alcoves and on open sites; and social trailing and user-created parking areas in or across sites.

In a study of 24 grazing allotments in GSENM, Zweifel (2016) found that among those allotments with previously documented grazing-related impacts on cultural resources, those impacts had been substantially reduced over the years prior to this study. Zweifel attributes the apparent reduction in grazing-related impacts to possible lessening of actual grazing pressures, differential land use by cattle year to year, vegetation changes, and simple weather-related erasure of cattle use indicators over time and between seasons of use. Grazing impacts on cultural resources within BLM-managed grazing allotments in Glen Canyon have been noted in past assessments by the NPS showing damage from animal trampling, artifact breakage, livestock rubbing against structures and petroglyphs, and cattle trails causing increased erosion within Rock Creek-Mudholes, Lake, and Soda allotments (NPS 2001). Allotments that are wholly or partially unavailable for livestock grazing in Glen Canyon include 88,600 acres, and an additional 1,608 acres are available but not currently being grazed.

Forecasts

Under current management, conditions will likely remain relatively stable. Recreation and tourism are expected to increase regionally and are expected to accordingly increase in GSENM. Such increased visitation will likely bring increased access to more remote cultural resources. More visitation to these more remote locations could have an associated impact on these sites.

Under current management, grazing restrictions that were implemented for the initial GSENM area were removed from portions of GSENM. Removal of these areas allowed for increased grazing in those areas in the KEPA. If those reduced restrictions were to remain—which would be the case under current management—then there could be increased grazing-related impacts on cultural resources in those areas in the former KEPA lands that have been added back into GSENM.

Wildfire and other natural forces resulting from climate change will continue to stress resources in GSENM. With wildfires, sensitive materials and objects may be damaged or destroyed, but post-fire conditions may threaten sites through intensified erosion or other post-fire processes. Post-fire conditions, including the removal of vegetation cover, can increase the accessibility for unauthorized off-route travel. Fluctuations in precipitation, freeze-thaw cycles, and seasonal access to GSENM are also stressing cultural resources. High-intensity rainfall may alter erosional patterns and accelerate structural decay, while fluctuations in weather patterns may permit a wider window of visitor access.

Since GSENM's inception, the BLM has successfully employed many National Historic Preservation Act Section 110 projects or archaeological survey projects in GSENM designed to collect background information and for scientific inquiry rather than as a response to ground-disturbing projects. Set aside as a monument with protection and research goals, GSENM has hosted many archaeological researchers, field schools, and graduate students. Several important archaeological studies and documents have been

produced about GSENM. GSENM's staff has been the only contributor to the Utah BLM Cultural Resource publication series for the past 20 years or more. In addition, the BLM in GSENM has sponsored additional research that has contributed many more important research documents to the realm of archaeological research. The future of GSENM will see continued support for such projects.

3.6.2 Environmental Consequences

Refer to **Section F.11**, Cultural Resources, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would proposed management impact historic properties?
- How would proposed management protect cultural resources, including traditional cultural landscapes, traditional uses, and historic properties?

Impacts Common to All Alternatives

The types of environmental consequences associated with all alternatives are similar in their potential to impact cultural resources and potentially adversely affect historic properties per Section 106. The alternatives are broad in scope and do not indicate specific project-level effects, which would be addressed; if necessary, adverse effects would be avoided, minimized, or mitigated through the Section 106 process. Management actions associated with each alternative all have the potential to affect cultural resources, primarily through ground disturbance and alterations to the setting. However, since these are federal undertakings, the protection of cultural resources would be addressed via Section 106 under all alternatives. Similarly, coordination and consultation with consulting parties, as defined under 36 CFR 800, would also continue in accordance with federal laws and regulations.

Potential threats to cultural resources under all alternatives are those activities not initiated by BLM actions: wildfire, erosion, looting, vandalism, and trespass. However, the extent of unauthorized human actions does have the potential to be curbed in various degrees by the management activities under Alternatives B, C, and D.

Potential impacts on cultural resources are increased when visitation and access increase (Nyaupane et al. 2006; Pinter and Kwas 2005). In some cases, motor vehicle access is particularly impactful, as shown in a study at Tonto National Forest that positively correlated the damage to cultural resources through looting and vandalism with proximity to roads and other vehicular travel routes (Hedquist et al. 2014). The kind or condition of road did not make a significant difference to the level of effects, and the specific impacts included looting, graffiti, removal and reuse of archaeological material (such as stones for fire rings), and vehicle use on and around sites. Hedquist and others (2014) also found that effective measures for mitigating these impacts were travel access restrictions, advisory signage, and site monitoring programs. In other cases, newly created motor vehicle access did not create impacts, as shown in the Falcon to Gonder Transmission Project 5-year Monitoring Study. The goal of this 5-year monitoring study was to document impacts from an increase of traffic to sites related to the construction of a new transmission line and access roads. The second goal was to provide data that could be used to understand potential impacts for future linear projects. After watching sites and the individual artifacts within these sites for 5 years, the archaeologists found that increased accessibility did not lead to any vandalism or looting.

There is the potential for wildfires to continue under all the alternatives. Wildfires impact cultural resources by burning cultural material and features, decreasing soil stability, increasing erosion, exposing sites to artifact collecting and looting, and changing the overall setting and characteristics of cultural resources. These impacts increase with uncharacteristic wildfires where the size and severity of the fire are greater. Fire also alters the physical and chemical characteristics of artifacts and features that are not consumed by flames via thermal alterations and deposition of soot and tar that can affect analytical analyses, including dating techniques such as thermoluminescences and obsidian hydration analysis (Ryan 2010). Human responses to wildfire, such as the construction of lines and the application of water and foam, can also harm cultural resources both physically and chemically. Climate change has increased the scale and frequency of wildfire's impacts on cultural resources (Davis 2018).

Climate change also accelerates other natural processes that have the potential to physically disturb cultural resources, such as vegetation changes, altered precipitation, increased ice and snowmelt, and accelerated freeze and thaw cycles. All these stressors have the potential to physically move artifacts and accelerate decay (Davis 2018).

Under all alternatives, there are a total of 881,100 acres of WSAs in 16 areas, with identical acreages. The cultural resources in these areas are largely protected from potential impacts, such as ground disturbance or changes in the visual or auditory settings, due to reduced motorized uses and restrictions on development. As the designation of these areas and management are static across all alternatives, they will not be discussed further. Public use categories would also be maintained for Dance Hall Rock, Catstair Canyon, and Paria Townsite.

Livestock grazing would occur to varying degrees under all alternatives and is another stressor that creates potential impacts on cultural resources through breakage of artifacts, mixing of deposition contexts, deterioration of structures, and acceleration of erosion in grazed areas. Experimental studies have shown that livestock trampling impacts both the physical artifacts and features of a site. It also distorts the most common analytical approaches to measuring sites, such as artifact abundance, raw material proportions, and average artifact dimensions (Osborn et al. 1987; Douglass and Wandsnider 2012). Livestock trampling also causes the vertical displacement of artifacts, especially in wet ground (Eren et al. 2010).

BLM-managed grazing allotments in Glen Canyon that would be unavailable for grazing under all alternatives include Escalante River, Harveys Fear, Navajo Bench, and Spencer Bench. Allotments in Glen Canyon that would be available for grazing under all alternatives include Last Chance, Lower Cattle, Moody, Upper Cattle, Upper Warm Creek, and Wire Grass. Any cultural resources, recorded or yet unknown, would be at risk from impacts from grazing, as described above.

Alternative A

Under Alternative A, the No Action Alternative, plan elements would remain from the 2020 Approved RMPs. These plan elements include direction for the identification, preservation, and protection of cultural resources; the reduction of threats and conflicts from other resources; restoration and stabilization; opportunities for traditional use; and the development of cultural resource management plans. Aspects of planning management direction unique to Alternative A include the use of the 2020 GSENM-KEPA Final EIS Appendix J (Cultural Resources) criteria to assign cultural resources to use categories.

Alternative A would allow for maximum discretionary uses within GSENM, which in general would include the most acreages open to ROW authorization, recreational facilities, RMAs and RMZs, grazing, OHV use, and a full range of vegetation management. These aspects of Alternative A have the potential to impact cultural resources.

In an experimental study, Howard (2016) found that out of a range of factors, including animal access, slope, and erosion, vehicle access also resulted in the highest artifact breakage rates and movement distance. Alternative A would include five SRMAs, two ERMAs, which include seven RMZs that would cover the entire GSENM. The 2020 Approved RMPs also do not directly address recreational facilities, though there would be few restrictions outside WSAs. Alternative A is the only alternative that would include acreage open to OHV travel. Transportation route maintenance is also not addressed in the 2020 Approved RMPs.

Under Alternative A, the greatest number of acres would be available for livestock grazing, all suspended AUMs would be activated, and new range improvements would be allowed where they are not restricted by another designation. Livestock can impact cultural resources by trampling cultural materials, leaning or rubbing on standing walls and features, and causing soil compaction and wallows within sites. These impacts are greater if livestock infrastructure, such as water troughs, is established within or near cultural resources. A project-specific Section 106 process would be completed prior to installing any new livestock improvements, and range improvements, such as fencing, water troughs, and vegetation management, can also serve to control the location of grazing livestock, and when done in coordination with GSENM staff, this could allow for the avoidance of conflicts with cultural resources. However, existing conflicts would continue without specific management direction to identify and mitigate these impacts.

Livestock grazing would continue in BLM-managed allotments in Glen Canyon, including portions Fortymile Ridge, Lake, Lake Powell, Last Chance, Lower Cattle, Lower Warm Creek, Moddy, Nipple Bench, Rock Creek-Mudholes, Soda, Upper Cattle, Upper Warm Creek, Wagon Box Mesa, and Wire Grass (see **Figure 2-14, Appendix A**). Recorded and unknown cultural resources in those allotments would be at risk of continuing impacts from grazing activities, which include over 300 eligible resources among just seven of those allotments as of 2001 (NPS 2001).

Alternative A would expose the highest number of known cultural resources, both in total and for eligible resources, to potential impacts from management decisions, including open ROW authorizations, open OHV travel, RMAs, and grazing availability (**Table 3-45**). While project-specific Section 106 compliance would seek to avoid, minimize, or mitigate any impacts on cultural resources from these management decisions, the risk for unintentional impacts from conflicting uses or impacts on unrecorded resources would be greatest under Alternative A.

Table 3-45. Numbers of Cultural Resources in Right-of-way, Off-highway Vehicle, Recreation, and Grazing Management Areas by Alternative

National Register Status by Management	Alternative A	Alternative B	Alternative C	Alternative D
ROW Management				
Open to ROW authorization				
Listed	1	—	—	—
Eligible	745	275	44	26
Not eligible	331	162	45	16

3. Affected Environment and Environmental Consequences (Cultural Resources)

National Register Status by Management	Alternative A	Alternative B	Alternative C	Alternative D
Undetermined/no data	1,182	202	42	20
<i>Subtotal</i>	2,259	639	131	62
ROW avoidance area				
Listed	—	1	1	—
Eligible	428	928	1,001	161
Not eligible	158	343	404	97
Undetermined/no data	399	1,252	1,221	217
<i>Subtotal</i>	985	2,524	2,627	475
ROW seasonal avoidance area				
Listed	—	—	—	—
Eligible	117	72	111	111
Not eligible	30	10	25	25
Undetermined/no data	38	19	32	32
<i>Subtotal</i>	185	101	168	168
ROW exclusion area				
Listed	—	—	—	1
Eligible	697	689	783	1,696
Not eligible	135	123	169	554
Undetermined/no data	778	811	1,008	2,126
<i>Subtotal</i>	1,610	1,623	1,960	4,377
ROW grand total	5,039	4,887	4,886	5,082
OHV Management				
Closed to OHV travel				
Listed	—	—	—	1
Eligible	—	711	842	1,778
Not eligible	—	138	190	559
Undetermined	1	822	999	2,099
<i>Subtotal</i>	1	1,671	2,031	4,437
OHV travel limited to existing and designated routes				
Listed	1	1	1	—
Eligible	1,847	1,191	1,058	250
Not eligible	611	489	439	158
Undetermined	2,217	1,457	1,289	347
<i>Subtotal</i>	4,676	3,138	2,787	755
Open to OHV travel				
Listed	—	—	—	—
Eligible	1	—	—	—
Not eligible	—	—	—	—
Undetermined	—	—	—	—
<i>Subtotal</i>	1	—	—	—
OHV grand total	4,678	4,809	4,818	5,192
Grazing Management				
Available for grazing				
Listed	1	1	1	1
Eligible	1,738	1,711	1,711	778
Not eligible	588	561	561	267
Undetermined	2,133	2,113	2,113	1,434
<i>Subtotal</i>	4,460	4,386	4,386	2,480

National Register Status by Management	Alternative A	Alternative B	Alternative C	Alternative D
Unavailable for grazing				
Listed	—	—	—	—
Eligible	108	132	133	1,071
Not eligible	9	37	37	335
Undetermined	83	103	105	793
<i>Subtotal</i>	200	272	275	2,199
Grazing grand total	4,660	4,658	4,661	4,679
Recreation Management				
ERMAs				
Listed	1	1	—	—
Eligible	1,735	1,697	526	291
Not eligible	569	544	179	71
Undetermined	2,135	2,118	849	139
<i>Subtotal</i>	4,440	4,360	1,554	501
SRMAs				
Listed	—	—	—	—
Eligible	148	264	600	302
Not eligible	59	83	159	87
Undetermined	134	145	343	177
<i>Subtotal</i>	341	492	1,102	570
Recreation grand total	4,781	4,852	2,656	1,071

Source: BLM GIS 2022

Note: Some sites cross multiple management areas within a single alternative. As a result, a small number of sites have been counted more than once in management area subtotals and grand totals.

Alternative A also would include the most acres of high-probability areas (according to the cultural resources predictive model) that would be open to potentially impactful management. This would include the most acres of high-probability areas open to ROW authorization, open to OHV travel, in RMAs, and available to grazing (Table 3-46).

Table 3-46. Cultural Resources High-Probability Acreage in Right-of-way, Off-highway Vehicle, Recreation, and Grazing Management Areas by Alternative

ROW Management	Alternative A	Alternative B	Alternative C	Alternative D
Open to ROW authorization	204,700	33,600	5,000	1,300
ROW avoidance area	108,400	269,900	245,200	4,900
ROW exclusion area	162,200	178,200	226,500	470,300
ROW seasonal avoidance area	16,200	9,900	15,100	15,100
<i>Subtotal</i>	491,500	491,600	491,600	491,600
OHV Management				
Closed to OHV travel	100	175,000	234,900	483,200
OHV travel limited to existing and designated routes	491,400	316,600	256,700	8,400
Open to OHV travel	100	—	—	—
<i>Subtotal</i>	491,600	491,600	491,600	491,600
Recreation Management				
ERMAs	470,900	460,500	162,400	49,100
SRMAs	20,500	32,300	91,100	37,100
<i>Grand Total</i>	491,400	492,800	253,500	86,300

ROW Management	Alternative A	Alternative B	Alternative C	Alternative D
Grazing Management				
Available for livestock grazing	487,900	462,400	462,400	248,700
Unavailable for livestock grazing	7,500	25,500	25,500	239,200
<i>Subtotal</i>	<i>487,900</i>	<i>487,900</i>	<i>487,900</i>	<i>487,900</i>

Source: BLM GIS 2022

Alternative A would offer the least protection for cultural resources. No new ACECs would be designated, though No Mans Mesa RNA (ACEC) would continue to be managed. Outside WSAs, all lands would be either open or avoidance areas for ROWs, permits, and leases for land and realty development. Lands with wilderness characteristics would not receive any special management strategies that could limit discretionary uses. Alternative A also would include the fewest acres closed to OHV use and grazing.

Alternative A would include the fewest number of known cultural resources that would be protected from potential impacts by lands with wilderness characteristics management strategies and designations of ACECs and RNAs (ACECs) (Table 3-47). Other management actions that could protect cultural resources, such as areas closed to OHV use, ROW exclusion areas, and lands unavailable for livestock grazing, also contain the fewest number of known sites under Alternative A (see Table 3-45).

Table 3-47. Numbers of Cultural Resources in Lands with Wilderness Characteristics and Areas of Critical Environmental Concern by Alternative

National Register Status by Management	Alternative A	Alternative B	Alternative C	Alternative D
Lands with Wilderness Characteristics Management				
Lands with wilderness characteristics managed to protect wilderness characteristics				
Listed	—	—	—	1
Eligible	—	24	64	355
Not eligible	—	3	20	131
Undetermined	—	53	143	580
<i>Subtotal</i>		<i>80</i>	<i>227</i>	<i>1,067</i>
Lands with wilderness characteristics managed to minimize impacts				
Listed	—	—	1	—
Eligible	—	—	282	—
Not eligible	—	—	110	—
Undetermined	—	—	439	—
<i>Subtotal</i>			<i>832</i>	
Managed for discretionary use while not protecting lands with wilderness characteristics				
Listed	1	1	—	—
Eligible	355	331	11	—
Not eligible	131	128	1	—
Undetermined	580	527	1	—
<i>Subtotal</i>	<i>1,067</i>	<i>987</i>	<i>13</i>	
Lands with wilderness characteristics grand total	1,067	1,067	1,072	1,067

National Register Status by Management	Alternative A	Alternative B	Alternative C	Alternative D
ACEC Management				
ACECs				
Listed	—	—	—	—
Eligible	—	157	—	—
Not eligible	—	14	—	—
Undetermined	—	338	—	—
ACEC grand total	1	509	457	1

Source: BLM GIS 2022

Note: Some sites cross multiple management areas within a single alternative. As a result, a small number of sites have been counted more than once in management area subtotals and grand totals.

Alternative A would include the lowest acreage of high-probability areas (according to the cultural resources predictive model) that would fall within lands with wilderness characteristics management, ACECs, and RNAs (ACECs) where use restrictions would offer increased protection to cultural resources (Table 3-48). Alternative A also would not employ the cultural resource probability model to inform lands, and realty planning and management directions for ROW avoidance and exclusion.

Table 3-48. Cultural Resources High-Probability Acreage in Lands with Wilderness Characteristics, Area of Critical Environmental Concern, and Research Natural Area Management Areas by Alternative

Lands with Wilderness Characteristics Management	Alternative A	Alternative B	Alternative C	Alternative D
Lands with wilderness characteristics managed to protect wilderness characteristics	—	12,800	44,700	153,800
Lands with wilderness characteristics managed to minimize impacts	—	—	108,000	—
Managed for discretionary use while not protecting lands with wilderness characteristics	153,800	141,000	1,100	—
<i>Subtotal</i>	<i>153,800</i>	<i>153,800</i>	<i>153,800</i>	<i>153,800</i>
ACECs and RNAs (ACECs)				
<i>ACEC</i>				
Warm Creek	—	2,000	—	—
Willis Creek	—	3,400	—	—
<i>RNA (ACEC)</i>				
Fiftymile Mountain	—	30,700	30,700	—
Little Spring Point	—	—	—	—
No Mans Mesa	100	100	100	100
<i>Subtotal</i>	<i>100</i>	<i>36,300</i>	<i>30,900</i>	<i>100</i>

Source: BLM GIS 2022

Impacts Common to Alternatives B, C, and D

Under Alternatives B, C, and D, the BLM would reduce the number of acreages allotted for management decisions with the potential to impact cultural resources and increase the acreages of designations and exclusions that would protect cultural resources. However, each of these three alternatives includes variations in the number of acres for each management direction; those will be discussed in the following alternative-specific sections.

Under each alternative (Alternatives B, C, and D), plan elements specific to cultural resources would be largely the same as shown in **Chapter 2**. These plan elements are similar in intent to those of Alternative A; however, the reduction of the threats and conflicts, the restoration and stabilization of important and at-risk resources, and providing opportunities for traditional uses would move from being goals and objectives to being management directions. This would make them more action oriented and add detail, such as specific direction to avoid, reduce, or remove imminent and long-term threats and to identify, monitor, and stabilize at-risk cultural resources. Therefore, Alternatives B, C, and D would provide at least a clearer and more action-oriented set of directions that would improve the ability of GSENM staff to provide information and educational resources about cultural resources to the public, compared with Alternative A.

Alternatives B, C, and D also would replace the management direction of Alternative A to develop CRMPs for KEPA and GSENM units with direction to develop an implementation-level CRMP to provide guidance on resource- and site-specific strategies to protect resources in place. Alternatives B, C, and D also would include a plan element to employ the cultural resources predictive model to manage ROW authorizations in high-probability areas; this is not included under Alternative A. However, Alternative D differs from Alternatives B and C in excluding ROWs in those areas.

Alternative B

Under Alternative B, proposed management flexibility would allow for a maximum of discretionary uses while still providing resource protection. Alternative B would include at least a slight reduction in acreages of actions that pose potential impacts on cultural resources, such as areas open to ROW authorization, in RMAs, available for grazing, and open to OHV use. Recreational facilities could be allowed in accordance with RMA prescriptions. The acreage of ROW avoidance areas would be significantly increased under Alternative B, and proposed actions would be evaluated on a project-specific basis to ensure resource protection. No areas would be completely open to OHV use under Alternative B. The acreage of areas closed to OHV use would be dramatically increased from Alternative A. Under Alternative B, livestock grazing management, with greater restrictions on permits and range improvements, would cause less impacts than under Alternative A. Under Alternative B, impacts on cultural resources from grazing on BLM-managed allotments in Glen Canyon would be similar to Alternative A, except for the addition of Big Bowns Bench as unavailable for grazing (see **Figure 2-15, Appendix A**).

Compared with Alternative A, Alternative B would expose fewer known cultural resources, both in total and for eligible resources, to potential adverse effects from management decisions, including open ROW authorizations, open OHV travel, RMAs, and grazing availability (**Table 3-45**).

Compared with Alternative A, Alternative B would reduce the acres of high-probability areas (according to the cultural resources predictive model) that would be open to potentially impactful management. This includes the significantly fewer acres of high-probability areas open to ROW authorization, no acres of high-probability areas open to OHV travel, slightly fewer acres of high-probability areas in RMAs, and a reduction of high-probability acreage in areas available to grazing, compared with Alternative A (see **Table 3-46**).

Compared with Alternative A, Alternative B would include a higher number of known and eligible cultural resources that would be protected from potential impacts by lands with wilderness characteristics management strategies and designations of ACECs and RNAs (ACECs) (**Table 3-47**). Other management

actions under Alternative B that could protect cultural resources, such as areas closed to OHV use, ROW exclusion areas, and lands unavailable for livestock grazing, also would protect a higher number of known and eligible sites, compared with Alternative A (see **Table 3-45**).

Compared with Alternative A, Alternative B would include more acreage of high-probability areas according to the cultural resources predictive model that would fall within lands with wilderness characteristics protection management and ACECs where use restrictions would offer increased protection to cultural resources (see **Table 3-48**). This includes the designation of Fiftymile Mountain RNA (ACEC) (see **Section 2.4.3**), a 56,800-acre area specifically created to protect cultural resources and other scientific opportunities by prohibiting ROWs, prohibiting target shooting, limiting camping to permit only, and developing monitoring and management plans in coordination with grazing permittees.

Alternative C

Under Alternative C, proposed management would use an area approach to allow for the accommodation of considered discretionary uses in appropriate settings while also protecting GSENM objects. Alternative C would include a reduction in acreages of actions that pose potential impacts on cultural resources, such as areas open to ROW authorizations, in RMAs, available for grazing, and open to OHV use compared with Alternative A. There would be a greater number of RMAs, though they would not cover all GSENM. Recreational facilities would be allowed in accordance with management areas; in general, they would have more of an impact in the front country area and be nonexistent in the primitive area. Under Alternative C, Fiftymile Mountain RNA (ACEC) would also be designated as under Alternative B.

The acreage of ROW exclusion areas would increase under Alternative C, compared with Alternatives A and B. Cultural resources would be protected from soil-disturbing activities that would be prohibited in the outback and primitive areas. No areas would be completely open to OHV use under Alternative C. The acreage of areas closed to OHV use would be increased compared with Alternatives A and B. Livestock grazing management would feature fewer available acres and greater restrictions on permits and range improvements than under Alternative A. .

Under Alternative C, impacts on cultural resources from grazing within BLM-managed allotments in Glen Canyon would be less than under Alternatives A and B, as pastures and allotments fully within Glen Canyon would be made unavailable for livestock grazing, including portions of Big Bowns Bench, Fortymile Ridge, Lake, Lake Powell, Lower Warm Creek, Rock Creek-Mudholes, and Soda (see **Figure 2-16, Appendix A**).

Alternative C would expose fewer known cultural resources, both in total and for eligible resources, to potential adverse effects from management decisions, including open ROW authorizations, open or limited OHV travel, and RMAs, compared with Alternatives A and B. The same number of sites under Alternative C would be exposed to grazing availability as under Alternative B (**Table 3-45**).

Alternative C would reduce the acres of high-probability areas (according to the cultural resources predictive model) that would be open to potentially impactful management, compared with Alternatives A and B. This includes the significantly fewer acres of high-probability areas open to ROW authorizations and in RMAs. Alternative C would include the same acres of high-probability areas open to OHV travel and available to grazing as Alternative B (see **Table 3-46**).

Compared with Alternatives A and B, Alternative C would include a higher number of known and eligible cultural resources that would be protected from potential impacts by lands with wilderness characteristics management strategies. The same number of sites would be included in RNAs (ACECs) as under Alternative B, though no sites would be included in ACECs under Alternative C (**Table 3-47**). Other management actions under Alternative C that could protect cultural resources, such as areas closed to OHV use, ROW exclusion areas, and lands unavailable for livestock grazing, also would protect a higher number of known and eligible sites, compared with Alternatives A and B (see **Table 3-45**).

Compared with Alternatives A and B, Alternative C would include more acreage of high-probability areas (according to the cultural resources predictive model) that would fall within lands with wilderness characteristics protection and minimization management strategies. However, compared with Alternative B, slightly less high-probability acreage would be within ACECs and RNAs (ACECs), where use restrictions would offer increased protection to cultural resources (see **Table 3-48**).

Alternative D

Under Alternative D, proposed management would maximize natural processes and resource protection by limiting discretionary uses. Alternative D would include the least acreages of actions that pose potential impacts on cultural resources, such as areas open to ROW authorization, in RMAs, available for grazing, and open to OHV use, compared with Alternatives A, B, and C. Alternative D would have the fewest number of RMAs, and they would cover the least number of acres. Recreational facilities would be prohibited outside RMAs. No new ROWs would be authorized under Alternative D, no areas would be completely open to OHV use, and the greatest acreage would be closed to OHV use. Under Alternative D, vegetation management would prioritize natural processes, and livestock grazing management would include the greatest restrictions on permits and range improvements.

Under Alternative D, impacts on cultural resources from grazing within BLM-managed allotments in Glen Canyon would be the least of all alternatives; portions of Nipple Bench and Wagon Box Mesa would be added to the allotments from Alternatives B and C as unavailable for grazing (see **Figure 2-17, Appendix A**).

Alternative D would affect the fewest known cultural resources, both in total and for eligible resources, from management decisions, including open ROW authorizations, open or limited OHV travel, RMAs, and grazing availability, compared with Alternatives A, B, and C (**Table 3-45**).

Alternative D would include the fewest acres of high-probability areas (according to the cultural resources predictive model) that would be open to potentially impactful management, compared with Alternatives A, B, and C. This includes the significantly fewer acres of high-probability areas open to ROW authorizations and in RMAs. Alternative D would include the least acres of high-probability areas for OHV travel and the least available to grazing (see **Table 3-46**).

Alternative D also would offer the most management actions that could protect cultural resources. While there would be no new ACECs or RNAs (ACECs) under Alternative D, Alternative D would include the highest number of acres of lands with wilderness characteristics that would be managed to protect their characteristics. Alternative D also would include a plan element to employ the cultural resources predictive model to exclude ROW authorizations in high-probability areas. The BLM would not include

this element under Alternative A, and the BLM would manage ROWs by avoidance in those areas under Alternatives B and C.

Alternative D would include the highest number of known and eligible cultural resources that would be protected from potential impacts by lands with wilderness characteristics management strategies, compared with Alternatives A, B, and C. Other management actions under Alternative D that could protect cultural resources, such as areas closed to OHV use, ROW exclusion areas, and lands unavailable for livestock grazing, also would protect the highest number of known and eligible sites, compared with Alternatives A, B, and C (see **Table 3-45**).

Alternative D would include the least amount of high-probability acreage within ACECs and RNAs (ACECs), where use restrictions would offer increased protection to cultural resources, compared with Alternatives B and C (see **Table 3-48**). However, other provisions of Alternative D would include significantly greater acreages of high-probability areas that would be protected by limiting ground-disturbing activities under VRM classifications, LWC management strategies, grazing unavailability, ROW exclusion, and OHV closures.

Cumulative Impacts

The BLM-managed, Forest Service-managed, NPS-managed, and adjacent state, tribal, county, and privately owned land surrounding GSENM are the cumulative effects analysis area for cultural resources. Ongoing and planned actions in and near GSENM would influence cultural resource management on a regional scale. The time frame for cumulative environmental consequences for future actions is the life of the RMP.

The cumulative impacts of past and present actions on cultural resources in the planning area are captured in the description of the *Trends and Forecast* sections of the *Affected Environment* (**Section 3.6.1**). Primarily, these actions include unauthorized collection of artifacts and historic objects, increased visitation and recreation, and grazing. In particular, increased OHV use has the potential to be impactful given the ease of access and increasing visitation to GSENM.

Reasonably foreseeable future actions for the KFO, including the East Zion Initiative, Shinarump Mountain Bike Trail and Trailhead Development, and Paunsaugunt Travel Management Plan projects, have the potential to disperse visitors out of GSENM. Ongoing recreation projects within GSENM include the Calf Creek Recreation Site Deferred Maintenance and Improvements Project, where adverse effects on two archaeological sites will be mitigated by a recently signed memorandum of agreement.

Wildfire and other natural forces resulting from climate change will continue to stress resources in GSENM. The reasonably foreseeable future actions in GSENM that have the potential to increase the potential for human-caused fire ignitions include increased visitation and recreation and ROW development projects, including the Newer Garkane Transmission ROW (Buckskin to Fredonia Powerline), the Garkane Transmission ROW, and Lake Powell Pipeline ROW.

Current cultural resource management practices at GSENM, such as site monitoring and co-stewardship programs, public education and law enforcement, and lessening grazing pressures, appear to have resulted in the stabilization of current conditions of cultural resources in GSENM. These and other reasonably foreseeable future projects that would be considered federal undertakings under the National Historic Preservation Act will be subject to Section 106 compliance that should avoid, minimize, or mitigate any potential adverse effects on cultural resources. However, no cultural resource compliance effort can

completely remove the possibility of adverse effects, as even the most intensive survey efforts cannot guarantee the identification of all cultural resources in a given area.

Compared with Alternative A, Alternatives B, C, and D would reduce the potential risk for impacts on cultural resources to cumulatively reach significant levels through the exclusion or restriction of discretionary uses. Of Alternatives B, C, and D, Alternative D would offer the highest degree of protection for cultural resources.

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3.7 TRIBAL INTERESTS

3.7.1 Affected Environment

The planning area has been occupied by Native American communities since time immemorial. Tribes that have occupied and used lands within the planning area include the Hopi Tribe of Arizona, Kaibab Band of Paiute Indians, Navajo Nation, Paiute Indian Tribe of Utah (includes Shivwits Band of Paiute Indians, Indian Peaks Band of Paiute Indians, Kanosh Band of Paiute Indians, Cedar Band of Paiute Indians, and Koosharem Band of Paiute Indians), Pueblo of Acoma, Pueblo of San Felipe, Pueblo of Tesuque, San Juan Southern Paiute Tribe of Arizona, Ute Mountain Ute Tribe, Ute Indian Tribe of the Uintah and Ouray Reservation, and Zuni Tribe of the Zuni Reservation. In addition to these tribes, the BLM is coordinating with the All

Pueblo Council of Governors, which includes the pueblos noted above as well as the pueblos of Cochiti, Isleta, Jemez, Laguna, Nambe, Ohkay Owingeh, Picuris, Pojoaque, San Ildefonso, Sandia, Santa Ana, Santa Clara, San Domingo, Taos, and Ysleta del Sur.

Native American peoples make up a substantial portion of the region's population (see **Section 3.22**, Environmental Justice). There are many locations and traditional uses within the decision area that contribute to the lives of individual Tribal Members, including ritual, spiritual, and economic contributions (see **Section 3.21**, Social and Economic Values).

The BLM maintains a relationship with the tribes that used, and continue to use, the planning area for important cultural activities. The BLM has the responsibility to conduct government-to-government consultations with tribes. This includes ensuring the responsibilities outlined in Joint Secretarial Order 3403, Fulfilling the Trust Responsibility to Indian tribes in the Stewardship of Federal Lands and Waters, and the subsequent BLM Instruction Memorandum 2022-11, which provides direction for implementing provisions of Joint Secretarial Order 3403 in relation to co-stewardship with federally recognized Indian and Alaska Native tribes. Co-stewardship could include, among other things, sharing of technical expertise; combining tribal and BLM capabilities to improve resource management and to advance the responsibilities and interests of each; and making tribal knowledge, experience, and perspectives integral to the public's experience of federal lands. Providing opportunities for co-stewardship with interested Tribal Nations is a critical component of this planning effort.

Current Conditions

Tribes historically have used, and continue to use, numerous places within the planning area for habitation, natural resources gathering, hunting subsistence, travel routes, and spiritual and religious ceremonies (see **Section 3.6**, Cultural Resources). Practices that continue today include, but are not limited to, visiting culturally important locations and sacred sites, gathering plants, and hunting (see **Section 3.22**, Environmental Justice). Resources of interest to tribes can include locations within the planning area, landforms, water resources, plant communities, and landscapes that encompass several interconnected natural and cultural resources, as described above. Some locations of importance and use by tribes may be manifested as physical remains on the ground, such as archaeological and historic sites (see **Section 3.6**, Cultural Resources); however, many are topographic features and landforms, natural resources, or resources of concern and use that are only evident in oral traditions.

While these locations of use and importance may be documented and known to non-tribal members, many others are known only to tribal members. Some of these sites and locations may be considered traditional cultural properties, which are defined as historic properties that are eligible for inclusion on the National Register because of their association with cultural practices or beliefs of a living community that are rooted in that community's history and are important to maintaining the continuing cultural identity of the community (Parker and King 1998).

Historic properties are often identified and generally managed under the National Historic Preservation Act, which requires consideration of impacts on historic properties, such as archaeological sites, buildings, structures, or objects that are over 50 years of age and eligible for listing on the National Register, such as the Hole-in-the-Rock Trail Traditional Cultural Property (NPS 2022; also see **Section 3.6**, Cultural Resources). Known traditional cultural properties that are not formally documented as historic properties are also managed as important resources. Additionally, other resources are important to tribes, such as

plants, animals, landforms, and natural features, that may or may not meet the traditional definition of historic properties under the National Historic Preservation Act. However, they are managed under other regulations or policy, such as the American Indian Religious Freedom Act or Executive Order 13007.

Resources of interest to tribes for ceremonial, traditional, and religious uses are generally identified by Tribal Nations during consultation and collaboration efforts (Executive Orders 13007 and 13175). Over years of consultation and coordination, the BLM, in collaboration with tribes, has developed a library of cultural resource and ethnographic information related to tribal use and important locations and resources within the planning area. Multiple ethnographic reports about the planning area, many of which are confidential, provide this information for the Hopi Tribe (Dongoske et al. 1997; Bernardini 2005; Molenaar and Greaves 2013), Kaibab Band of Paiute Indians (Stoffle et al. 2004), Navajo Nation (Begay 2003), Southern Paiute and associated bands (Kelly 1964; Southern Paiute Advisory Committee 2011; Van Vlack 2012), and Zuni Tribe of the Zuni Reservation (Dongoske et al. 1997; Colwell-Chanthaphonh et al. 2011).

Many other sources include information on the historical use of the area by tribes, notably the Southern Paiute, although these sources may not include the details and specific locations and uses provided in ethnographic reports (see Spangler and Zweifel 2021). It is important to note that these documents provide relevant, specific information, but they are not exhaustive and do not encompass all tribes that maintain connections to the planning area.

For some tribes, maintaining confidentiality and customs regarding traditional knowledge and important locations can take precedence over identifying and evaluating these resources, resulting in some information being unavailable for inclusion in the NEPA and Section 106 analysis. Many of the sources of information noted above that provide information on tribal use and resources of importance to tribes, along with associated oral traditions and stories, are considered confidential. Therefore, discussion of these places and uses with specific reference to locations is not possible within this framework. However, through ongoing consultation and research, it is possible to broadly identify the types of locations and resources within the decision area that could be important to tribes, including but not limited to:

- Water sources, notably springs and their associated plant communities and associated hanging gardens; other perennial and ephemeral water sources; and their associated landscapes, plant communities, animals, and viewscapes
- Landscape features, such as prominent outlooks, rock outcroppings, peaks, and plateaus, to include views of and from these locations as well as traditional and ceremonial uses
- Cultural resource locations, such as important archaeological or historic sites, or areas of dense past habitation
- Cultural landscapes, both large and small, such as Buckskin Mountain and Kaiparowits Plateau, which represent many different cultural uses, practices, and oral traditions
- Trails, both for travel and pilgrimage, and their associated activities and ceremonial locations. For example, Hole-in-the-Rock Trail is likely associated with earlier trails used by Native people traversing the Kaiparowits Plateau.
- Plant and animal resources, including hundreds of various plants and animals, as well as their habitats (see Sabata 2018)

It is important to note that the above locations and uses do not exist in isolation; it is the interconnection of various resources within a defined area that make the locations and uses of continuing interest and importance to tribal communities. Springs are an excellent example of the interrelated nature of resources; this is because they are associated with water, plants, and animal communities across a landscape area and the relationship of those to oral traditions and continuing use that define the importance, not the presence of water alone. Therefore, the areas of tribal importance above encompass both physical features as well as intangible cultural practices.

Tribal use of important locations and resources, such as those noted above, is tied to the spiritual and physical setting of those locations, which can encompass the natural and cultural resources, quiet and solitude, and important viewsheds and soundscapes, as well as connections between places and oral traditions. Additionally, tribal use is often contingent upon access and potentially the presence of a particular resource (that is, mineral and plant materials). Management actions and ongoing uses that result in changes to setting or access to important locations and resources can impact tribal uses within the decision area.

Currently, several ongoing actions and activities have the potential to impact the setting, access to, and availability of locations and resources important to tribes. These include visitor access, recreation, livestock grazing, development, and ROW authorizations. Additionally, management approaches to vegetation and water management could result in impacts on the availability of important natural resources, such as plants, animals, or water. Conversely, important characteristics of the setting of a tribal location or use might be more easily achieved in areas with lands with wilderness characteristics, ACECs, WSAs, and RNAs (ACECs); this is because these areas often emphasize natural and cultural resource protections and minimize mechanized access.

Table 3-49 summarizes the current condition of management actions and activities that may impact or change important locations and resources of tribal use. While it is not possible to determine the specific impacts that would occur to locations and resources of tribal use due to the sensitive nature of their locations, it is possible to infer that where these activities are expansive (cover greater areas), there is a greater potential for changes or impacts on tribal resources.

Table 3-49. Current Management and Activities that Could Impact Locations and Resources Important to Tribes

Resource/Use	Current Status
<i>Travel and Transportation (Acres)</i>	
Closed to OHV use	2,800
OHV travel limited to existing and designated routes	1,862,700
Open OHV use	100
<i>RMAs (Acres)</i>	
ERMAs	1,797,700
SRMAs	67,600
RMZs (SRMA and ERMA)	17,400
Total	1,865,600
<i>Livestock Grazing (Acres)</i>	
Available	2,116,200
Unavailable	125,800

Resource/Use	Current Status
<i>Lands and Realty (Acres)</i>	
ROW exclusion	881,300
ROW avoidance	332,800
Open to ROW authorization	630,400
Designated corridors	11,378
<i>Lands with Wilderness Characteristics (Acres)</i>	
Strategy 3 (no protection)	559,600
<i>ACECs and RNAs (ACECs)</i>	
Total acreage of all areas designated	2,800
<i>WSAs</i>	
Total acres	881,100

Trends

Increased visitation to and recreation at GSENM have caused impacts on locations and resources important to tribes both by physically damaging resources and by introducing new uses in areas that disrupt traditional tribal uses. Increasing use and the presence of visitors can interrupt or impede tribal ceremonies and uses. Increasing travel on and off established routes, as well as regular maintenance such as road grading, impacts many locations within or near roads. Additionally, impacts from visitors and recreation, such as the creation of user-defined trails, vandalism and graffiti within cultural resource sites, spread of invasive species, removal of artifacts at cultural resource sites, and unauthorized removal of vegetation by nontribal users, could impact tribal practices and traditional gathering. Increasing visitation and recreation, as well as accessibility of locational information on the internet and social media, have increased public knowledge of some important locations such as archaeological sites, springs, and alcoves. Increasing public knowledge of these locations can result in increased visitation to these locations and inadvertent and deliberate damage from camping, graffiti and vandalism, social trails creation, and user-created access points.

Additionally, natural processes affected by changing climate conditions are impacting tribal locations and resources across GSENM. With increasing fuel loads from decades of fire suppression (see **Section 3.13**, Fire and Fuels Management) potential for severe wildfire is increasing. While some tribal locations and resources may be better protected within the 559,600 acres of lands with wilderness characteristics (approximately 25 percent), it may be more difficult to complete fuels treatments within these areas, resulting in an increased potential for severe wildfires in these areas. Increasingly severe weather linked to climate change may also impact locations and resources of interest to tribes across GSENM. Climate-related fluctuations in weather can influence natural processes such as freeze/thaw cycles and severe flash flooding due to monsoons or rapid snowmelt, altering the rate of erosion and the times of year when visitors have access to certain areas.

Forecast

Conditions are likely to remain similar to those described above under *Current Conditions* and *Trends*. Recreation and visitation are expected to continue to increase, along with the spread of sensitive locational information on the internet and social media. Climate change-related environmental impacts are also anticipated to continue. Impacts on locations and resources of interest to tribes from these factors such as vandalism, graffiti, unauthorized artifact collection, and increased erosion are likely to continue and intensify. With increasing visitation and use of GSENM, there is expected to be some increase in travel

management decisions related to road, trail, and OHV use, as well as requests for ROWs. Additionally, wildfires would continue to be a potential issue, and they may increase in frequency and intensity with changing climate conditions and current management approaches.

3.7.2 Environmental Consequences

Refer to **Section F.12**, Tribal Interests, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would proposed management ensure continued traditional uses of religious or cultural resource sites important to Tribal Nations and local communities?
- How would proposed management impact landscapes of religious or cultural importance to Tribal Nations and local communities?

Impacts Common to All Alternatives

The alternatives are programmatic in nature and do not indicate specific project-level impacts; these would be addressed, and if necessary mitigated, at the project level. The main pathway for addressing and mitigating impacts on tribal interests is through coordination and consultation with federally recognized tribes that maintain ties to GSENM. Management actions that have the potential to impact tribal interests vary among the alternatives; however, government-to-government coordination and consultation would continue under all alternatives and would contribute to avoidance or minimization of potential impacts.

Impacts on tribal interests from unauthorized activities would also occur under all alternatives, such as unintentional human-caused wildfires or vandalism; however, some management actions have the potential to influence the degree to which unauthorized activities occur.

Travel management decisions, such as road, trail, and OHV use designations, would continue to be considered under all alternatives. These decisions could affect the quantity of visitors to different areas in GSENM and how they are able to reach different locations. While restrictions to travel within GSENM may be protective of some resources or areas of interest to tribes, they would also restrict the ability of tribal members to access resources or areas of interest to tribes.

Recreation and visitation are likely to increase regardless of which alternative is chosen. Thus, the potential impacts from increases in user encounters and disruption of the characteristics of the setting that make certain tribal locations and resources important. The disruption could include increased damage to cultural landscapes and cultural resources, visual changes from social trails and trash, and an increased presence of people and noise.

The BLM would allow grazing under all alternatives with similar impacts expected where grazing is available, though the amount and location of available allotments varies by alternative, as discussed below. Potential impacts on tribal locations and uses from grazing include ground disturbance and visual changes from allotment improvements, as well as potential ground disturbance and vegetation changes from the presence of cattle. Grazing and its associated activities can increase the potential for the spread of invasive species, which may impact traditional areas of plant gathering or hunting. Additionally, livestock can cause ground disturbance, particularly near water sources and archaeological sites that might be important to tribes, resulting in changes to the setting of important places and resources.

The BLM would continue to allow ROWs, although the locations where they would be allowed varies by alternative. ROWs can impact resources or areas of interest to tribes, including both landscape features, views, and disruptions in activities. Impacts may be greater in the short term due to the increased presence of equipment and personnel related to construction activities. Long-term impacts include changes in views, noise, and ground disturbance within important areas. The magnitude of these impacts would all vary based on the nature of proposed development.

The potential for wildfires would continue under all alternatives. Wildfires impact resources important to tribes in the long term by directly damaging locations and landscapes; this could potentially change tribal use of an area if specific plant species are lost or certain areas are disturbed. Additionally, the loss of vegetation cover increases the potential for erosion and related impacts on locations of importance to tribes, such as cultural resources. Tribal access to burned areas may be restricted in the short term following a wildfire due to safety concerns or damage to infrastructure, such as roads. However, all alternatives include fire and fuels management that reduces the likelihood of uncharacteristically severe wildfire. This management would protect tribal interests by preserving the appearance of landscapes and preventing uncharacteristically severe damage to any resources of interest to tribes present in the affected areas. Under all alternatives, efforts would be made to restore landscapes after wildland fire and maintain and restore ecosystems, including allowing fire to function in its natural ecological role, when possible.

Vegetation management would occur under all alternatives. These treatments could result in short-term disruption to tribal access to the area and potentially, the availability of resources (such as plants or animals). However, in the long term, these treatments should increase the availability of those resources and potentially improve locations and resources, depending on the nature of their importance (such as efforts to improve or protect riparian areas and springs).

Special designations, such as lands with wilderness characteristics and WSAs, or the management of specific areas as ACECs or RNAs (ACECs), have the potential to result in preservation and protection of locations and resources important to tribes. While the acreages of some designations vary by alternative, the general protections are largely the same. The WSAs would remain a total of 881,100 acres across 16 areas, with identical acreages and locations across all alternatives. Special designations are largely anticipated to be generally protective of resources and areas of interest to tribes, such as landscapes, vegetation communities, and cultural resources, by limiting ground disturbance and changes in the visual or auditory setting due to reduced motorized uses and restrictions on development.

Under all alternatives, the general and resource-specific conservation measures described in **Appendix C**, Resource Conservation Measures, would offer protection to resources and areas of interest to tribes. This is because these measures offer mechanisms such as BMPs (see **Appendix C**) regarding reduction of visual impacts from development or protection of water quality.

Alternative A

Under Alternative A, the potential impacts on locations and resources of tribal interest are anticipated to continue as described in the *Trends and Impacts Common to All Alternatives*. The BLM would continue to consult with tribes; however, under Alternative A there is no formal management direction related to tribal co-stewardship. The BLM would continue to seek these opportunities and collaboration on tribal co-stewardship per direction in BLM Instruction Memorandum 2022-11 and Joint Secretarial Order 3403 regarding co-stewardship with federally recognized Indian and Alaska Native tribes.

Under Alternative A, access to GSENM is facilitated by an existing road system, with vehicle and OHV travel restricted to existing and designated routes for the vast majority of GSENM (see **Table 3-49**); therefore, while it is possible to access areas along existing and designated routes, off-road use is not allowed. This allows tribal members access to areas while making it possible to find quiet and solitude away from these routes without unexpected interruptions from vehicles. There is the potential for user encounters along access routes, particularly where those routes access areas that are popular for both tribal and general visitation.

Recreation is likely to continue increasing throughout GSENM, with impacts similar to those described in *Impacts Common to All Alternatives*. There is the potential for encounters between tribal members and other recreational users throughout much of GSENM. These encounters are most likely to occur where uses are concentrated, such as in RMAs designated as SRMAs, which emphasize specific recreation opportunities (see **Table 3-49**). Currently, the majority of RMAs at GSENM are considered ERMAs, which emphasize management for the benefit of multiple recreational uses but may not take into account tribal uses and concerns.

Under Alternative A, 2,116,200 acres would be available for livestock grazing. The impacts noted in *Impacts Common to All Alternatives* could occur throughout this area. Given the extent of areas available for grazing under this alternative, there is an increased likelihood that grazing would impact locations and resources important to tribes. Additionally, there could be incompatibility between grazing and its associated activities and tribal uses, such as increased presence of cattle and people.

Approximately 630,400 acres would be open to ROW authorizations under Alternative A. While the exact impacts on tribal locations and uses would be determined on a project-by-project basis, the potential impacts are expected to be similar to those described in *Impacts Common to All Alternatives*. These impacts would be avoided on the 881,300 acres of ROW exclusion areas and minimized on the 332,800 acres of ROW avoidance areas (see **Table 3-49**).

Under Alternative A, the BLM would continue to manage vegetation and water resources as described in **Section 3.3**, Vegetation, and **Section 3.4**, Water Resources. A full range of vegetation management methods would be available for consideration, and vegetation management would be prioritized in areas where removal of woodland products would improve rangeland health, wildlife habitat, and forage. Impacts are anticipated to be the same as described under *Impacts Common to All Alternatives*. The BLM would allow surface-disturbing research in reference plant communities (referred to as “relict” under Alternative A management) if it is designed to promote the overall health and understanding of these areas. This would increase the potential for impacts on plant communities that are of interest to tribes.

Water developments and maintenance would be allowed for visitor- and recreation-related uses in high-use remote areas, and to improve livestock and wildlife distribution. Since water and its associated resources, such as plant communities, are of particular interest to tribes, water source development activities increase the potential for impacts on resources that are of interest to tribes. Maintenance of existing water developments would be allowed if it would not affect reference plant communities and hanging gardens. This management direction would reduce the potential for impacts on plant communities that are of interest to tribes.

Areas with special designations and management areas would continue as summarized in **Table 3-49**. These areas would continue to provide some protections and preservation of tribally important locations and resources.

Impacts Common to Alternatives B, C, and D

Alternatives B, C, and D include a formal objective related to ensuring continued tribal stewardship with the goal of honoring Tribal Nations' stewardship, interests, and uses through the inclusion of objectives and management directions concerning tribal co-stewardship that are identical. While much of the management direction and objectives align with current practices, under Alternatives B, C, and D, this guidance is more explicit in directing how to protect tribal interests and foster tribal involvement in the land use planning process. Following the approval of this RMP, the BLM would develop an implementation-level Tribal Nation co-stewardship plan. Increased tribal involvement in the land use planning process from development and implementation of a co-stewardship plan would result in reduced frequency and severity of impacts on tribal interests compared with the existing management under Alternative A.

The collection of GSENM objects and/or resources would be prohibited under Alternatives B, C, and D, with some exceptions, including providing for collection and traditional uses by Tribal Nations where consistent with federal and state law. This would increase protections afforded to resources important to tribes, such as plants and minerals, while continuing to provide tribal access to these resources.

Alternatives B, C, and D emphasize landscape-scale ecosystem restoration projects to restore functional vegetation communities. This would have long-term, beneficial impacts on locations and resources of interest to tribes by focusing on the larger ecosystem, which is in line with tribal perspectives on the interrelatedness of resources, and by reducing the likelihood of uncharacteristically severe wildfire at the landscape scale. Alternatives B, C, and D also encourage the use of prescribed fire across GSENM, except where fire suppression would protect high-priority values, such as life, or wildland fire would be otherwise inconsistent with the protection of GSENM objects. While these management activities are anticipated to have long-term benefits to natural resources, including those important to tribes, they could also create short-term impacts in the form of visual setting changes and restrictions to access while the BLM carries out these activities.

Under Alternatives B, C, and D, discretionary actions within riparian communities associated with hanging gardens would be prohibited, except for actions that protect the hanging gardens. This is an important protection of a resource that multiple tribes have noted as particularly important to tribal uses and practices.

Alternatives B, C, and D include direction to mitigate impacts on water quality from discretionary actions through minimization and avoidance. Direction also exists to minimize the quantity of water used by discretionary actions and to prohibit new water developments in natural plant communities that lack invasive species. This would facilitate protection of water resources, which have been noted by multiple tribes as important locations and resources. This would also protect native plant communities and plants that are gathered by tribal communities.

Under Alternatives B, C, and D, management of lands with wilderness characteristics with the priority of protecting those wilderness characteristics, such as the appearance of naturalness and opportunities for solitude, also would offer protection to tribal interests by helping to preserve the natural appearance of

landscapes and reducing potential interruptions to tribal use. The acres allotted for the different management strategies differ under each alternative and are discussed by alternative below. Alternatives B, C, and D offer some degree of greater protection to tribal interests through management of lands with wilderness characteristics than under Alternative A.

Under Alternatives B, C, and D, promotion of science and research are prioritized as fundamental to management of GSENM; this is similar to under Alternative A. However, unlike under Alternative A, management direction exists to develop and maintain a GSENM science plan informed by Indigenous knowledge. Compared with Alternative A, Alternatives B, C, and D would result in fewer potential impacts on tribal interests from the pursuit of scientific research at GSENM.

Alternative B

Under Alternative B, travel management designations would change; the BLM would close 953,100 acres to OHV use, and 912,500 acres would have OHV travel limited to designated routes (a 51 percent reduction from Alternative A). The decrease in areas open to OHV use compared with Alternative A would offer greater protection to resources or areas of interest to tribes, particularly from user encounters or other impacts associated with vehicle use, such as increased erosion. This closure could also restrict the ability of tribal members to access these important locations and resources. Despite this, these closures and limitations on travel would increase opportunities to find quiet and solitude away from these routes without unexpected interruptions from vehicles and visitors.

Under Alternative B, impacts associated with recreation would be similar in nature to those described under *Impacts Common to All Alternatives*. Under Alternative B, approximately half of RMAs at GSENM would be considered ERMAs (1,770,100 acres, which is 27,600 acres less than under Alternative A). ERMAs emphasize management for the benefit of multiple recreational uses. While these areas do not necessarily take into account tribal uses and concerns, recreation is somewhat dispersed, which minimizes the potential for some impacts such as encounters between recreationalists and tribal members. Additionally, 95,300 acres would be designated as SRMAs (an increase of 27,700 acres from Alternative A). This difference in areas designated as RMAs compared with Alternative A is modest, but could result in reduced impacts such as encounters between tribal members and recreationists where their uses overlap. Recreation-related impacts on tribal interests under Alternative B would be similar, though likely slightly less in magnitude, to those described under Alternative A. Tribal consultation would be essential to understanding the potential and extent of impacts from SRMA designations on tribal use.

Impacts related to livestock grazing would be similar in nature to those described under Alternative A and as detailed in *Impacts Common to All Alternatives*. Under Alternative B, 2,037,700 acres would be available for livestock grazing (a 5 percent reduction from Alternative A), which could result in a slight decrease in impacts from Alternative A. However, the locations of grazing in relationship to locations and resources of tribal importance are not specifically known.

Under Alternative B, 85,100 acres would be open to ROW authorizations; this is an 87 percent reduction from Alternative A. While the exact impacts on tribal locations and uses would be determined on a project-by-project basis, the potential impacts within the areas open to ROWs are expected to be similar to those described in *Impacts Common to All Alternatives*. However, the potential for impacts would be reduced due to the limited area available for ROWs. Potential impacts would be avoided on the 976,400 acres of ROW exclusion areas and minimized on the 791,000 acres of ROW avoidance areas. Under

Alternative B, new water developments and maintenance of existing developments would be allowed if they contribute to the protection and restoration of GSENM objects, or increase the resiliency of GSENM objects. Compared with Alternative A, this would allow fewer potential impacts on water resources and plant communities of interest to tribes. Additionally, maintenance of existing water developments in natural plant communities that lack invasive species would be allowed in a manner that minimizes impacts on natural plant communities and best conserves multiple resources. Compared with Alternative A, this could result in more impacts on natural plant communities of interest to tribes.

Under Alternative B, impacts related to management of lands with wilderness characteristics would be the same as those described under *Impacts Common to All Alternatives*; the BLM would manage 487,600 acres (87.1 percent) of land with wilderness characteristics under Strategy 3 (no protections) and 72,000 acres (22.9 percent) of land with wilderness characteristics under Strategy 1 (protection). Compared with Alternative A, this would afford more protection to the wilderness characteristics of these lands and by extension to tribal interests. Additional protection of locations and resources important to tribes would occur with the designation of ACECs and RNAs (ACECs), such as the 56,800-acre Fiftymile Mountain RNA (ACEC), created specifically for the protection of cultural resources (see **Section 2.4.3** and **Section 3.6**). Under Alternative B, a total of 90,950 acres of ACECs and RNAs (ACECs) would be designated; this is an increase of 88,150 acres over Alternative A.

Alternative C

Under Alternative C, travel management designations would change; the BLM would close 1,210,100 acres to OHV use, and 714,900 acres would limit OHV travel to designated routes (a 62 percent reduction from Alternative A). The decrease in areas open to OHV use from Alternative A would offer greater protection to resources or areas of interest to tribes, particularly from user encounters or other impacts associated with vehicle use, such as increased erosion. However, similar to Alternative B, this closure could also restrict the ability of tribal members to access these important locations and resources.

Under Alternative C, impacts associated with recreation would be similar in nature to those described under *Impacts Common to All Alternatives*. The majority of RMAs at GSENM would be considered ERMA (486,300 acres, which is 1,311,400 acres less than under Alternative A). ERMA emphasize management for the benefit of multiple recreational uses. Additionally, 417,400 acres would be designated as SRMA (an increase of 349,800 acres from Alternative A). This overall decrease in areas designated as RMAs could result in decreased impacts, such as encounters between tribal members and recreationists where their uses overlap. Tribal consultation would be essential to understanding the potential and extent of impacts from RMA designations on tribal use.

Impacts related to livestock grazing would be similar in nature to those described under Alternative A and as detailed in *Impacts Common to All Alternatives*. Under Alternative C, 1,927,000 acres would be available for livestock grazing (a 10 percent reduction from Alternative A), which could result in a slight decrease in impacts from Alternative A. However, the locations of grazing in relationship to locations and resources of tribal importance are not specifically known.

Under Alternative C, 10,900 acres would be open to ROW authorizations; this is a 98 percent reduction from Alternative A. While the exact impacts on tribal locations and uses would be determined on a project-by-project basis, the potential impacts within the areas open to ROWs are expected to be similar to those described in *Impacts Common to All Alternatives*. Potential impacts would be avoided on an

additional 1,188,600 acres of ROW exclusion areas and minimized on the 646,600 acres of ROW avoidance areas.

Under Alternative C, the landscape-scale ecological restoration projects described under *Impacts Common to Alternatives B, C, and D* would be influenced by an area approach to vegetation management, where the front country, passage, and outback areas would focus on proactive management, while the primitive area would prioritize the use of natural techniques and processes over other methods. While prioritizing natural processes and techniques over other methods in the primitive area may limit the amount of short-term impacts to areas of tribal interest such as ground disturbance, the more proactive approach in the front country, passage, and outback areas would result in an increased pace of restoration activities.

Under Alternative C, management related to new water developments and maintenance of existing developments, and their associated impacts to areas of tribal interest, are identical to that under Alternative B.

Under Alternative C, impacts to tribal interests related to management of lands with wilderness characteristics would be the same as those described under *Impacts Common to All Alternatives*. However, the potential for impacts would be minimized on the 190,100 acres managed under Strategy I (protection); this would be an increase over Alternative A, which includes no acres under Strategy I. Additional protection of locations and resources important to tribes would occur with the designation of 57,680 acres of ACECs, 54,800 acres of which are in the Fiftymile area, created for the protection of cultural resources (see **Section 2.4.3** and **Section 3.6**). This is an increase of 54,880 acres over Alternative A, but a 43 percent reduction from Alternative B.

Alternative D

Under Alternative D, travel management designations would change; the BLM would close 1,638,800 acres to OHV use, and 226,800 acres would limit OHV travel to designated routes (an 88 percent reduction from Alternative A). The decrease in areas open to OHV use from Alternative A would offer the greatest protection to resources or areas of interest to tribes and minimize the potential for user encounters or other impacts associated with vehicle use, such as increased erosion. However, this alternative has the greatest potential to impact tribal access due to the reduction in areas available for travel.

Between Alternatives B, C, and D, Alternative D would designate the fewest acres as ERMAs (251,200 acres) and SRMAs (161,000 acres). This overall reduction in emphasis on recreation would potentially minimize user overlap between tribal members and recreationalists and potential impacts on locations and resources of tribal use. However, since recreational use is anticipated to increase, users would become more concentrated in these RMAs. This concentration of use could result in more impacts on locations and resources important to tribes if there is overlap between these areas and RMA designations. Consultation would be critical to understanding and minimizing these impacts.

Impacts related to livestock grazing would be similar in nature to those described under Alternative A and as detailed in *Impacts Common to All Alternatives*; however, Alternative D would result in the greatest reduction of acres available compared with Alternative A. Specifically, Alternative D would have 1,150,000 acres available (a 46 percent reduction from Alternative A). This could result in a greater decrease in impacts compared with Alternative A, although the locations of grazing in relationship to locations and resources of tribal importance are not specifically known.

Under Alternative D, 2,300 acres would be open to ROW authorizations; this is an almost 100 percent reduction from Alternative A. Another 1,693,700 acres would be designated as ROW exclusion and 150,100 acres as ROW avoidance. This reduction in area would result in the greatest protection and preservation of locations and resources of tribal interest compared with Alternative A; however, the exact impacts on tribal locations and uses would be determined on a project-by-project basis.

Under Alternative D, the landscape-scale ecosystem restoration projects described under *Impacts Common to Alternatives B, C, and D* would focus specifically on restoring native, functional vegetation communities and would prioritize natural processes and techniques over other methods. Compared with Alternative A, this would reduce short-term direct impacts, such as ground disturbance and visual or auditory intrusions, on resources and landscapes of interest to tribes from restoration activities. While prioritizing natural processes and techniques over other methods may limit the amount of short-term impacts, it could also limit the pace and scale of restoration activities because of the techniques not prioritized, such as mechanical pre-treatments for prescribed burns, negatively impacting many of the natural resources of interest to tribes such as water sources, wildlife, and vegetation communities in the long term.

Wildland fire management would be similar to that described under *Impacts Common to Alternatives B, C, and D*, except that additional management directions exist that prioritize natural stabilization, rehabilitation, and restoration processes and techniques over other methods. Compared with Alternative A, this focus on natural processes and techniques would reduce short-term impacts on resources and landscapes of interest to tribes by limiting impacts associated with nonnatural techniques, such as ground disturbance and visual or auditory intrusions. While prioritizing natural processes and techniques over other methods may limit the amount of short-term impacts, it would also limit the pace and scale of restoration activities because of the techniques not prioritized, such as mechanical pre-treatments for prescribed burns, negatively impacting many of the natural resources of interest to tribes such as water sources, wildlife, and vegetation communities in the long term.

Under Alternative D, new water developments would be prohibited unless the primary purpose of the water development is to protect or restore the resiliency of GSENM objects. Additionally, management direction would both prohibit new water developments in natural plant communities that lack invasive species (as under Alternatives B and C) and remove existing water development in these areas, unless it would further harm resources. Compared with Alternative A, these actions would protect these important tribal resources and result in fewer potential impacts on water resources and plant communities of interest to tribes.

Under Alternative D, potential impacts on locations and resources important to tribes would be minimized on the 559,600 acres of lands with wilderness characteristics managed under Strategy I (protection); this is an increase over Alternatives A, B, and C. However, only 2,800 acres of ACECs and RNAs (ACECs) would be considered under this alternative; this is the same as under Alternative A. Overall, the protections achieved through designating 559,600 acres of lands with wilderness characteristics under Strategy I would encompass areas of importance and, therefore, increase protection for tribal resources compared with Alternative A.

Alternative D has the most potential to protect and preserve locations and resources important to tribes due to reduced area designations related to vehicle use, recreation, grazing, and ROW development, and increased area designations related to lands with wilderness characteristics. However, ACEC designations

under Alternative D would be the same as under Alternative A and would provide the smallest amount of protection to natural resources from these designations among the alternatives. Alternative D would reduce the potential for impacts on tribal interests through vegetation management activities intended to support landscape-scale restoration and ecological resilience compared with Alternative A. However, the lack of management direction specifying proactive vegetation management (as seen under Alternatives B and C), and the prioritization of natural methods present only under Alternative D, would likely reduce the number of restoration projects that use active management methods. While this could limit the amount of short-term impacts on tribal interests such as ground disturbance and visual or auditory intrusions, it would also limit the pace and scale of restoration activities by limiting the techniques available for use (see **Section 3.3**, Vegetation, and **Section 3.13**, Fire and Fuels Management). This would impact many of the natural resources of interest to tribes such as water sources, wildlife, and vegetation communities in the long term.

Cumulative Effects

Cumulative effects evaluate the potential impacts on areas and resources of tribal importance from the alternatives when combined with past, present, and reasonably foreseeable actions. For tribal interests, the geographic scope for the cumulative effects analysis (the cumulative effects study area) includes all lands within GSENM and the adjacent surrounding area, regardless of ownership. The temporal bound is the life of the RMP.

Increasing human population around GSENM's boundaries contributes to increased visitation and use within the cumulative effects study area, and greater chances for unintentional disturbance, vandalism, and looting. Tourism campaigns in recent years, such as those by the Utah Office of Tourism, have highlighted the surrounding national parks and outdoor recreation in and around GSENM accessible from towns in southern Utah such as Kanab and Escalante. These campaigns could exacerbate potential impacts on areas of tribal importance and affect access and traditional use of those areas by tribes. The effects of climate change leading to a warmer, drier climate can influence natural disturbances to areas of tribal importance. This is primarily through increased wildfire conditions and erosion as a shift to less snow and more rain and more intense rainstorms lead to greater frequencies of runoff and erosional processes. These changes in climate will influence the rate at which natural processes impact areas of tribal importance, potentially affecting access and traditional use of those areas by tribes.

Compared with Alternative A, Alternatives B, C, and D would reduce the potential for impacts on tribal interests through the exclusion or restriction of discretionary uses, such as limiting areas available for camping or OHV use. Of the alternatives, Alternative D would offer the most protection to tribal interests through restriction of discretionary uses, although acres of ACEC designations under Alternatives A and D are the smallest among the alternatives.

Compared with Alternative A, Alternatives B, C and D would reduce the potential for impacts on tribal interests through vegetation management activities intended to support landscape-scale restoration and ecological resilience. Alternative B would offer the most protection to tribal interests through active vegetation management, reducing the risk of uncharacteristically severe fires.

3.7.3 References

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3.8 PALEONTOLOGICAL AND GEOLOGICAL RESOURCES

The decision area is near the western margin of the Colorado Plateau physiographic province. It comprises a series of plateaus, buttes, and mesas that reflect the type and structure of the underlying geological strata (**Figure 3-29, Appendix A**). The Colorado Plateau is characterized by relatively flat-lying strata that have been locally offset and folded during vertical movements between north- and south-oriented blocks in the earth's crust. This uplift and folding have created the spectacular scenery for which the area is known worldwide. The diverse geological features include a sequence of sedimentary rock layers exposed in the western part of GSENM, known as "the Grand Staircase," which contributes to the GSENM name. To the east are the Kaiparowits Plateau, Escalante Canyons, and the Circle Cliffs Uplift adjacent to the famous Waterpocket Fold (Capitol Reef National Park).

The planning area includes bedrock geological formations ranging in age from the Permian period to the Late Cretaceous (265–73 million years ago), and unconsolidated Neogene deposits probably dating back to at least the early Pleistocene. Fossils occur in all bedrock formations and in the Neogene units in the planning area. Permian through Jurassic units yield fossil fauna and flora that can largely be viewed over wide areas of the Colorado Plateau.

GSENM's bedrock geological units record the earth's surface conditions during the end of the Permian to the end of the Cretaceous (almost the entire Mesozoic era), as well as the postdepositional effects of the Laramide Orogeny and uplift of the Colorado Plateau, overprinted with Neogene erosional features. Given its proximity to the western portion of the Cordilleran foreland basin, the stratigraphic record is especially complete and of interest to researchers studying end-Permian and Mesozoic climate, isotopic records, tectonics, stratigraphy, rock-forming processes, sedimentation patterns, and numerous other topics. Examples of groundbreaking geological research in GSENM include insights into Martian iron concretion formation (known as "blueberries"), the living biofilms that inhabit rocks, and the effects of massive submarine volcanic eruptions on the shallow marine ecology and stratigraphy. Approximately one-quarter of all research permits issued to researchers working in GSENM are for geological and geomorphological studies.

Between one-third to one-half of all permits issued to GSENM researchers are for paleontological studies. The most paleontologically important bedrock formations, largely because of their vertebrate fossil content, are the Chinle and Morrison Formations and the entire Late Cretaceous succession. Of these, the Late Cretaceous succession is unique to the planning area and holds extremely high scientific and public significance. Dozens of new dinosaur and other large vertebrate taxa (such as giant turtle and giant alligator), as well as hundreds of species of fish, turtles, amphibians, lizards, snakes, birds, and mammals, have been found (Titus et al. 2016). These finds make GSENM one of the most complete Late Cretaceous-aged terrestrial fossil vertebrate successions in the world.

Formation-by-formation summaries of resource type, distribution, and PFYC classes for all geological units in the decision area are summarized in **Table 3-50** and shown in **Figure 3-30** in **Appendix A**. **Table 3-51** summarizes the number of acres by PFYC value in the GSENM decision area. Because of the high significance of Cretaceous and other fossil resources within the decision area, the BLM has actively managed this resource since 2000. This has occurred through an in-house program, comparable to that at Dinosaur National Monument or John Day Fossil Beds National Monument, and by engaging in long-term partnerships with various museums and universities. The western Kaiparowits Plateau exhibits a high quality of animal preservation (of skin, nails, beaks, and other soft tissue) in the Kaiparowits Formation, continuity of the fossil record through the Late Cretaceous, and uniqueness of this fossil record to the Kaiparowits Plateau region. Formations exhibiting such characteristics can qualify as United Nations Educational, Scientific, and Cultural Organization World Heritage Sites.

FLPMA; 43 CFR part 49; special designation frameworks, such as national monuments; and the Paleontological Resources Preservation Act of 2009 provide the broad legal framework for federal agencies to manage fossil resources on federal lands. In the absence of a formal planning area paleontological management plan, the Annual Reports on file at GSENM and the BLM State Office discuss activities conducted through the paleontology program for the preceding year, and make programmatic resource management recommendations for the subsequent year, including survey and excavation areas of concentration. These reports provide the basis for management of paleontological resources.

Table 3-50. Paleontological Potential and Summary of Paleontological and Geological Sources of the Geologic Units Mapped within the Decision Area

Geologic Unit Name	Age	PFYC¹	Overview of Fossil, Geological, and Public Interest	Acres
Young stream alluvium, stream alluvium, and alluvial deposits	Holocene	2	Sediments are generally too young to contain fossils.	30,700
Eolian sand dune and sand deposits	Pleistocene to Holocene	2	Fossils are unlikely. Eolian arid deposits typically do not contain many fossils.	24,400
Mixed eolian and alluvial deposits and sand deposits	Pleistocene to Holocene	U	Fossils are unlikely. Eolian arid deposits typically do not contain many fossils. Holocene deposits are generally too young to contain fossils. Pleistocene alluvial deposits may contain fossils.	143,700
Slumps, landslides, and taluses	Pleistocene to Holocene	2	In situ fossils are unlikely. Fossils, if observed, will be out of their original geological context.	56,600
Slumps, landslides, and colluvium	Pleistocene to Holocene	U	In situ fossils are unlikely. Fossils, if observed in slumps or landslide deposits, will be out of their original geological context. Holocene colluvial deposits are generally too young to contain fossils, but Pleistocene deposits could contain fossils.	3,700
Volcanic debris flow and alluvial deposits and colluvial deposits	Quaternary	U	Primary sediments are unlikely to contain fossils, and in situ fossils are unlikely. Fossils, if observed, will be out of their original geological context.	1,100
Alluvium, alluvial gravel, stream-terrace alluvium, alluvial terrace, pediment alluvium, alluvial-fan, colluvium, and older colluvium	Pleistocene to Holocene	U	No known paleontological resources exist. Holocene deposits are generally too young to contain fossils. Pleistocene deposits could contain fossils. While no megafaunal sites have been documented in the decision area, two different mammoth sites are known from just outside it.	129,300
Basalt lava flows and cinder cones	Quaternary; Cenozoic	I	No fossils are known. Occurrences are rare due to the formation of igneous rocks.	100

3. Affected Environment and Environmental Consequences (Paleontological and Geological Resources)

Geologic Unit Name	Age	PFYC ¹	Overview of Fossil, Geological, and Public Interest	Acres
Kaiparowits Formation	Cretaceous	5	This formation has been extensively studied. It contains abundant but irregularly distributed microvertebrates; plants; invertebrates; and vertebrates. This is the richest vertebrate fossil-producing unit in the entire region that also contains crocodylians, mammals, squamates, turtles, and dinosaur skeletons, including dinosaur mummies. Preservation is sometimes spectacular, with complete or partial articulation and softer elements, such as epidermis and the keratinous portions of beaks and claws. Rare specimens show predatory or behavioral traits, including pack hunting by tyrannosaur and turtle skeletons with egg clutches. The high concentration of fossil bones and teeth exposed at the surface results in occasional unauthorized collection by the public. Except for the State Route/Highway 12 corridor through The Blues, many Kaiparowits Formation exposures are remote and away from main travel routes.	66,900
Wahweap Formation: upper member (Coyote Point and Pardner Canyon)	Cretaceous	4	Fossils and public interest are similar to that for the lower unit(s), but most significant fossils are confined to the Coyote Point member.	66,600
Wahweap Formation: lower member (Last Chance and Reynolds Point)	Cretaceous	5	This unit is fossiliferous throughout the planning area, with everything from petrified wood to large dinosaur skeletons. It contains numerous smaller vertebrates, such as mammals, lizards, and fish; a single tyrannosaur (<i>Lythronax</i>); and several horned dinosaurs and hadrosaur sites. <i>Deinosuchus</i> remains are not rare. Invertebrate sites with large terrestrial crabs, mollusks, and traces are common. Dinosaur tracksites are common between the lower and middle members. Substantial, widely distributed deposits of petrified wood occur in the lower member where wood specimens are relatively rare in the region. Historically, petrified logs at Head of the Creeks were the target of collecting (including illegal poaching) by locals in the Big Water-Church Wells-Page area. Many Wahweap Formation exposures are remote and away from main travel routes.	117,400
Straight Cliffs Formation: Smoky Hollow Member, Tibbet Canyon Member, Drip Tank Member, and John Henry Member, undivided lower and upper members	Cretaceous	4	Microvertebrates are more common than macrovertebrates. Associated dinosaur sites, including a multi-individual ornithopod bone bed, are uncommon. Large, isolated bones in stream channel lags are common locally but are not diagnostic. Terrestrial vertebrate sites are more common in the west half of the Kaiparowits Plateau. Marine vertebrate tooth and bone lags, dominated by shark teeth, as well as dinosaur trackways, occur on the eastern Kaiparowits Plateau. Petrified logs, plant fossils, and marine and freshwater invertebrates are common. Ledges and cliffs make survey work difficult. Unauthorized collecting of shark teeth and other vertebrate remains occurs in the lower portion near Tropic and Escalante; invertebrates and leaves are collected elsewhere.	386,400

3. Affected Environment and Environmental Consequences (Paleontological and Geological Resources)

Geologic Unit Name	Age	PFYC¹	Overview of Fossil, Geological, and Public Interest	Acres
Tropic Shale: undivided and upper unit	Cretaceous	4	This shale contains abundant, often well-preserved invertebrates (for example, ammonites and oysters); fish; marine reptiles, including turtles; sharks; plesiosaurs; the oldest and most primitive mosasaurs; and the most complete Late Cretaceous Therizinosaur dinosaur in North America. This shale records important evolutionary events from the demise of the archaic pliosaurids, diversification of plesiosaurs, and the rise of the mosasaurs. Shark teeth, as well as large invertebrate fossils, were historically targeted for hobby collecting and described in rock hounding guides. The public frequents the interpretive exhibits at the Big Water Visitor Center. Large exposures occur along the Cockscomb, around Croton Road and Little Valley, and along the Straight Cliffs and the southern margin of the Kaiparowits Plateau, between the Paria River and Last Chance Canyon.	59,400
Naturita (formerly called Dakota) Formation	Cretaceous	4	The Naturita Formation contains a diverse fossil record; however, except for shark and fish remains, vertebrate fossils are mostly in the lower member. The middle member contains a lagerstätte preservation of insects and spectacular plant fossils. The formation contains abundant vertebrate tracks, microvertebrate sites with placental and marsupial mammal teeth, and turtle shells. Other body fossils include bones of crocodylians, fish, and the occasional dinosaurs that may be preserved in small bone beds. Petrified wood is rare but occasionally occurs as logs and in situ stumps in the middle of the unit. The upper marine portion contains extensive invertebrate fossils, including a 6-foot-thick “oyster reef” deposit of shells and occasional shark teeth and unidentifiable bones. The well-preserved invertebrate fossils that occur locally at the top and plant fossils in the middle and lower units are known to hobby collectors, especially in the Cottonwood Canyon and Escalante areas. The public frequently visits in situ fossil sites such as those along Cottonwood Canyon Road. Blocks of weathered Naturita frequently form the caps on delicate hoodoos, such as at the Toadstools and Wahweap Creek. These are of immense interest to the public; if they collapsed, they may pose public hazards. Exposures are mostly along the margin of the Kaiparowits Plateau and around the Skutumpah Terrace, Henrieville, Cannonville, and Tropic.	23,000
Naturita and Cedar Mountain Formations, undivided	Cretaceous	4	The Cedar Mountain Formation’s fossils are mostly reworked bone and petrified wood from older units, including the Morrison Formation. See above for details on the Naturita Formation.	2,000

3. Affected Environment and Environmental Consequences (Paleontological and Geological Resources)

Geologic Unit Name	Age	PFYC¹	Overview of Fossil, Geological, and Public Interest	Acres
Morrison Formation	Jurassic	4	Regionally, this formation contains an important and diverse vertebrate fauna and is famous for dinosaurs. Locally, there are no extensive bone beds, but dinosaur and other bones are frequently observed, particularly around the Salt Wash-Brushy Basin contact. The formation contains gem-grade red jasper petrified wood in the Escalante area and widespread black to gray jasper in the eastern portion of the decision area. These areas were frequented by hobby collectors for landscaping and lapidary purposes. In situ logs are of high interest to the public. Morrison exposures are limited to around Escalante, on the east side of the Kaiparowits Plateau, and along the southern margin of the Kaiparowits Plateau as far west as Wiregrass Canyon.	18,300
Summerville Formation and/or the Tidwell Member of the Morrison Formation	Jurassic	4	As described above, the Morrison Formation is known for vertebrate fossils and petrified wood. In the Summerville Formation, body fossils are rare. Vertebrate trackways and traces, invertebrate traces, root casts, and colonial insect nests are more common.	300
Entrada Formation: Romana Sandstone	Jurassic	U	Body fossils are rare. Vertebrate trackways and traces, invertebrate traces, root casts, and colonial insect nests are common and widespread over much of the southern margin of the Kaiparowits Plateau region. The in situ trackways are of high interest to the public.	1,400
Entrada Formation: Henrieville Sandstone (or upper Entrada Sandstone)	Jurassic	U	Body fossils are rare. Vertebrate trackways and traces, invertebrate traces, root casts, and colonial insect nests are more common.	400
Entrada Sandstone (Formation)	Jurassic	U	Fossils are rare in the lower portion, which consists of dune deposition. In the upper portion, body fossils are rare, but vertebrate trackways and traces are common and widespread, occurring in the Romana Sandstone and Escalante Sandstone units over much of the southern margin of the Kaiparowits Plateau region and west of Hole-in-the-Rock Road at the base of the Straight Cliffs escarpment. The formation also includes root casts, colonial insect nests, and other invertebrate traces. The in situ trackways are of high interest to the public, including those at north Moccasin Mountain or North Coyote Buttes, and promoted as tourist destinations. Hoodoos, such as the Toadstools, Devil's Garden, and Wahweap, are of immense interest to the public; if they collapse, they may pose public hazards.	47,500
Carmel Formation: undefined, Co-op and Crystal Creek members	Jurassic	3	Conditions in the decision area during deposition were frequently hypersaline and toxic to most marine animals. There are few fossils, stromatolites, and invertebrate traces. Vertebrate tracks are virtually unknown, and no vertebrate body fossils are known.	28,400

3. Affected Environment and Environmental Consequences (Paleontological and Geological Resources)

Geologic Unit Name	Age	PFYC¹	Overview of Fossil, Geological, and Public Interest	Acres
Carmel Formation:page Judd Hollow member and upper members, including Winsor and Paria River	Jurassic	2	Conditions in the decision area during deposition were frequently hypersaline and toxic to most marine animals. There are few fossils, stromatolites, and invertebrate traces. Vertebrate tracks are virtually unknown, and no vertebrate body fossils are known.	94,400
Page Sandstone (undivided) and Thousand Pockets Tongue; may include the Judd Hollow Tongue of the Carmel Formation	Jurassic	3	This unit contains few fossils, which are limited to tracks. Geological features of public interest include Nautilus Rock in the Paria River area.	33,600
Temple Cap Sandstone	Jurassic	3	This sandstone contains few fossils; tracks are most likely to be observed.	< 100
Navajo Formation (Sandstone): undivided Sandstone and Lamb Point Tongue	Jurassic	3	Body fossils, including bones, are almost unknown due to the poor conditions that the windblown sand (dunes) offer for preserving these types of fossils. Regionally, rare body fossils occur, including tritylodontid reptiles and the dinosaurs <i>Segisaurus</i> , <i>Seitaad</i> , and <i>Ammosaurus</i> . In the decision area, most fossils are those of dinosaur and other vertebrate tracks and traces. However, there is a fish locality in the Paria Box. Especially in the Spencer Flat area, this sandstone contains iron concretions, septarian nodules, and Moqui marbles that may be similar to Martian blueberries. Navajo exposures are extremely difficult to access due to ledges or cliffy terrain. The in-situ trackways are of high interest to the public, including those at north Moccasin Mountain and North Coyote Buttes. The public frequents numerous arches, bridges, and slot canyons, including between Boulder and Escalante near the Paria River.	271,500
Kayenta Formation: main body, Tenney Canyon Tongue Member, and Springdale Sandstone	Jurassic	4	This unit is regionally famous for vertebrate fossils of dinosaurs, mammal-like reptiles, pterosaurs, frogs, and turtles. Identifiable tetrapod fossils are rare in the decision area. Bone fragments, including whole elements, occasionally are found in the Springdale Sandstone and main body. Fossil tracks and traces are the most common fossils. Petrified wood is common in the Springdale Sandstone and occasionally in the main body. Exposures are difficult to access due to ledges or cliffy terrain. The in situ trackways are of high interest to the public, including those in the Vermilion Cliffs area (such as Flag Point, Hackberry Canyon, and Seaman Wash).	50,800
Wingate Sandstone	Triassic	3	This sandstone contains a lower fossil potential due to arid depositional conditions. Vertebrate body fossils are primarily limited to the Chinle-Wingate contact. Numerous tracks are on slump blocks that are not in their original stratigraphic position. Exposures are difficult to access due to ledges or cliffy terrain.	8,100

3. Affected Environment and Environmental Consequences (Paleontological and Geological Resources)

Geologic Unit Name	Age	PFYC¹	Overview of Fossil, Geological, and Public Interest	Acres
Moenave Formation	Triassic to Jurassic	4	This formation contains numerous types of vertebrates, invertebrates, and plants. Fossils are limited in the west (Dinosaur Canyon Member) to occasional fish, fossil trackways, and microfossils; however, there is a greater abundance of fish and other vertebrate, as well as mollusks, other invertebrates, and stromatolites, in less arid deposits up the section in the cliffs west of Flag Point (Whitmore Point member). Some previous casual collection of stromatolitic masses and root casts occurred. Generally, these fossils are difficult to access due to ledges or cliffy terrain; exposures are primarily in the Vermilion Cliffs.	7,900
Chinle Formation:, Temple Mountain, Owl Rock, Petrified Forest, Church Rock, Monitor Butte, Moss Back, and Shinarump members	Triassic	4	This unit contains very diverse flora and fauna, including vertebrates, petrified wood, other plant fossils, invertebrates, and trace fossils, including trackways. The most common vertebrate fossils are remains of metoposaurs (giant salamander-like amphibians), as well as isolated bones; armored plates; teeth of large, crocodile-like animals called phytosaurs). Unusual and rare specimens include a fully articulated <i>Poposaurus</i> (a land-dwelling crocodile-like predator). Spectacular intact petrified logs in the Circle Cliffs area are part of the second-largest Triassic-age petrified forest in North America. Logs are also common at Vermilion Cliffs but are more rare due to poor exposures and historical commercial and casual collecting. The Chinle forms part of the Chocolate Cliffs of the Grand Staircase.	46,900
Moenkopi Formation: (upper red, Timpoweap Member, Shnabkaib, Moody Canyon, and middle red	Triassic	3	This unit is not particularly fossiliferous; there are a few sites, and several produce significant material. A mixture of marine and terrestrial fossil taxa include plants, crinoids, brachiopods, gastropods, bivalves, ammonoids, nautiloids, arthropods, fish, reptiles, labyrinthodont amphibians, and reptile tracks. Important localities include ammonites and abundant horseshoe crab tracks. Reptile tracks are mostly concentrated in single-bedding horizons and typically below the Virgin Limestone. Concentrations of invertebrates in the Timpoweap and Virgin Limestone may have attracted hobby collecting, especially of well-preserved ammonite fossils. Expansive outcrops near the Paria River Box and Circle Cliffs areas are of high interest for future geological studies; this is because these provide a continuous record of events following the largest extinction on earth. The middle unit in the Circle Cliffs Uplift includes roll-front uranium-ore mineral bodies.	61,000
Moenkopi Formation:lower red member and undivided	Triassic	4	This formation is as described above; note that the lower red member, as with the Timpoweap and Virgin Limestone, has a higher potential for unusual invertebrates, vertebrate trackways, and cephalopods than the other parts of the formation.	70,400
Permian Formations: (undivided), including the Kaibab and Toroweap Formations	Permian	3	This unit contains marine invertebrates that vary in distribution, taxonomy, and density by geologic unit. See individual formations for more details. Permian strata are limited to the Circle Cliffs and Buckskin Gulch (or Kaibab Gulch).	7,900

3. Affected Environment and Environmental Consequences (Paleontological and Geological Resources)

Geologic Unit Name	Age	PFYC¹	Overview of Fossil, Geological, and Public Interest	Acres
Kaibab Formation	Permian	3	Fossils, consisting of marine taxa and primarily sponges, are rare and restricted to certain beds within GSENM. The best is on the flanks of Fiftymile Mountain. Outside GSENM, fossils of a wide variety of marine taxa, including corals, crinoids, sponges, bryozoans, brachiopods, bivalves, gastropods, ammonoids, nautiloids, conodonts, and trilobites, are more common. Smaller fossils of invertebrates (such as brachiopods, corals, sponges, and clams) are the target of casual collecting, primarily of loose specimens preserved in nodular chert bodies. This formation is exposed in the Circle Cliffs and at the Type section in Buckskin Gulch (or Kaibab Gulch), which has elevated significance in the scientific community; it is a reference with which all other sections should be compared.	5,000
Toroweap Formation	Permian	3	This formation contains occasional marine invertebrates (for example, mollusks, brachiopods, and echinoderms). Vertebrates are virtually unknown. Exposures are in Buckskin Gulch.	500
Hermit Formation	Permian	3	This formation contains occasional marine invertebrates (for example, mollusks, brachiopods, and echinoderms). Vertebrates are virtually unknown. Exposures are in Buckskin Gulch.	< 100

Source: BLM GIS 2022; Titus et al. 2016

¹ PFYC classes:

1 = very low ; geologic units that are not likely to contain recognizable paleontological resources

2 = low; geologic units that are not likely to contain paleontological resources

3 = moderate; sedimentary geologic units where the fossil content varies in significance, abundance, and predictable occurrence

4 = high; geologic units that are known to contain a high occurrence of paleontological resources

5 = very high; highly fossiliferous geologic units that consistently and predictably produce paleontological resources

U = unknown; geologic units that cannot receive an informed PFYC assignment

Table 3-51. Acres of Potential Fossil Yield Classification within the Decision Area

PFYC	Total Acres
PFYC 1	100
PFYC 2	206,100
PFYC 3	416,000
PFYC 4	732,000
PFYC 5	184,300
PFYC U	327,200
Total acres	1,865,700

Source: BLM GIS 2022

3.8.1 Affected Environment

Current Conditions

The most significant geological features include special deposits of minerals or mineral bodies (such as the roll-front ores of the Circle Cliffs area and concentrations of iron concretion in the Spencer Flat area) and the large and small, special erosional landscape features (cliffs, canyons, slot canyons, and hoodoos) showcased at the Toadstools, along the Waterpocket and East Kaibab structures, in the canyons of the Escalante, along the Skutumpah Terrace, and in numerous badlands areas (such as The Blues, Paria Townsite, and The Cove). No special monitoring programs are currently in place for geological features. Collectible commodities, such as petrified wood, septarian and iron concretions, agate, and jasper, occur in various locations across the decision area. Looting of petrified wood from the Escalante and Circle Cliffs areas is common, and large volumes of iron concretions were illegally taken from the Spencer Flats area for commercial purposes in the past. No monitoring plan for geological hazards has been completed.

GSENM contains exceptional paleontological resources, with ongoing related science that involves excavations and discoveries. Fossils occur in the subsurface in unconsolidated or bedrock units and weathering on the surface in recent colluvium. Many fossils from GSENM are held in private and public collections. These exceptional paleontological resources are accessible due to the excellent exposures of their host geological formations.

Traditionally, the BLM has measured fossil condition with a single indicator: Are fossils in collections or in the field in good condition? However, beyond their simple presence on the landscape as inanimate objects integrated into the geology, they derive most of their value to humans as objects of scientific, public, hobby, or artistic use. In other words, the true indicators of resource condition and effective management are how fossils are utilized by various interest groups that are legally permitted to use them. While this is more labor intensive to implement and assess, it is imperative that special designation areas like GSENM strive toward such holistic active management. Such approaches are appropriately used in many NPS units that manage fossil resources of similar or lesser significance.

The BLM has been actively managing fossil resources in the decision area since 2000, when the first full-time staff paleontologist was hired. Since that time, the program has been working toward the desired conditions that include complete survey of sensitive areas (defined as PFYC Class 4 or 5 and those of low designation containing known fossil resources), publications on GSENM paleontological resources, federally approved curation of GSENM fossils, and public outreach through exhibits and in situ field sites. The paleontology program has not developed sites for public collecting, as public collecting is prohibited

under the past and current RMPs (BLM 2000, 2020a). In theory, such collecting sites could be permissible within a BLM-managed monument if they did not conflict with the Antiquities Act and the designating proclamation; however, this would complicate enforcement of rules prohibiting illegal collecting. Major paleontological resource partnerships formed to leverage resources and scientific management expertise facilitate cleaning and stabilizing fossils, curating important specimens, field collecting significant specimens, providing exhibits and interpretation, and conducting research. The higher the number of partnerships, the greater benefit the public and the fossils will receive. These do not necessarily need financial support.

On average, 5,000 to 6,000 new acres with moderate to very high potential for significant fossils (PFYC Classes 3, 4, and 5) are proactively inventoried within the decision area annually. The BLM's in-house paleontology program surveys approximately 1,500 acres annually; the remainder are surveyed through cooperative agreements with museums. Due to the nature of cyclic erosion in badlands, the goal is to survey the highest-potential, highest-significance areas by 2050, and then to begin to reexamine the highest-potential areas. Under current conditions, annual survey acreage is on track to reach that target.

In situ paleontological resource field sites are monitored for resource conditions and trends. Each year, approximately 20 to 30 sites are monitored for public impacts (including theft, vandalism, and unintentional impacts), the scientific potential, and the basic condition. This ensures the data needed to manage and conserve the sites are available. Currently, on average, approximately 5 to 15 larger quarries and approximately 300 to 500 new specimens are added to collections each year. This pace generally keeps up with the natural erosional threats to resources and ensures their protection.

The BLM works with its paleontological resource partners to ensure collections from GSENM are managed to curatorial standards. Approximately 15,000 specimens are housed at the Natural History Museum of Utah, which is GSENM's official repository. The largest collection of an additional 30,000 specimens (10,000 vertebrates and 20,000 plants) are housed at the Denver Museum of Nature and Science. Smaller but significant collections (approximately 7,000 specimens total) of GSENM fossils are housed at the Museum of Northern Arizona in Flagstaff; the Sam Noble Museum of Natural History in Norman, Oklahoma; the Raymond Alf Museum in Claremont, California; and elsewhere. High numbers of specimens not being housed to federal guidelines indicate a threat to the resource and a need for intensive intervention by the BLM. The collections' space is limited at most museums holding GSENM specimens.

Efforts to share scientific discoveries in GSENM are twofold: scientific publication and public exhibits and interpretation. An average of 2 to 10 publications (including abstracts) on GSENM paleontological resources are completed annually; approximately one to three exhibits are completed each year for public exhibition. Some of these are portable, while others are fixed at institutions like visitor centers and museum exhibit halls. Special public events and public outreach via lectures, schoolroom demonstrations, field tours, and others keep the public informed on issues and discoveries and gain public support for resource management.

Annually, there are typically between two and five instances of illegal fossil collection or resource destruction. Only one person has ever been cited or prosecuted for such crimes, as it is extremely difficult to do so unless they are caught in the act. There are currently no provisions for public casual collecting of fossils for hobby or educational purposes; this is because it is prohibited by current management, even though it was permissible on lands excluded from GSENM from 2019 to October 2021. Five sites—the Blues Overlook, Flag Point Tracksite, Twentymile Wash Dinosaur Tracksite, Cottonwood Canyon Oyster

Beds, and Wolverine Petrified Wood Area—are currently managed in situ for field-based paleontological interpretation or education. These sites are supported by interpretation, signage, and more.

Trends

Visitor use is increasing in the planning area. This will increase the probability of unique or significant paleontological and geological features and materials being affected. More visitor use will result in a greater potential for accident or injury from geological hazards and looting of both fossil and geological resources.

Geological resource partners complete analyses that provide further information about the depositional history of GSENM, the region, and beyond. Recently, this work has concentrated on the stratigraphy, including nomenclature, of the Cretaceous Wahweap and Kaiparowits Formations; biofilms that inhabit rocks; and the Mars-like concretions of Navajo Sandstone. Similar studies that refine geochronology, stratigraphic nomenclature, and geological processes are expected to continue at current levels or increase as analyses change and remote areas are explored.

The number of major paleontological resource partners has been stable over the years, with an increasing number finding their own support as BLM financial support has dwindled. However, in the last couple of years, two major partners (the Denver Museum of Nature and Science and the Raymond Alf Museum) suspended their field activities in GSENM. How this will specifically impact trends remains to be seen, but a decrease in the number of annual publications on GSENM fossils is possible. New partnerships (the Prehistoric Museum of Price) may lessen or alleviate the decrease in paleontological field activity, research, and publications.

The number of in situ field sites monitored for resource conditions and trends fluctuates depending on the number of sites excavated each year. A core set of approximately 20 sites are visited every year. An increasing number of in situ field sites is a positive trend, indicating a robust research and inventory program.

The acres in areas with significant fossil potential that are being proactively inventoried annually have stayed relatively constant since 2000, when the inventory program was established. Likely as a result, the number of significant fossils collected and curated annually has also remained relatively constant. The two major partners' decision to halt survey and excavation in GSENM could result in a decline in the total acres surveyed and the significant fossils collected and curated. As survey and collection continue at a near-constant rate and new collections are made, the number of fossils actively managed to curatorial standards in collections has steadily increased. No instances of objects being housed in unacceptable conditions have arisen, and that is the desired condition. If major partnerships dissolve or conditions change over time, standard GSENM-specific paleontological curation policy would be helpful for both new collections and those fossils collected but not formally curated.

The number of annual publications on GSENM paleontology has steadily increased since 2000, largely because of direct BLM support of research and inventory. Higher numbers of annual publications indicate effective, proactive management of the research component. While there have been no formal citations or prosecutions, instances of illegal fossil collection or resource destruction have increased since GSENM's establishment in 2000. Legal public fossil collection (or casual collection) has not been allowed in GSENM, except for some of those lands excluded from GSENM from 2019 to October 2021. With the exception of Camp Flats and Tibbet Head, these lands were temporarily available for casual collection of

noncommercial amounts of certain minerals and invertebrate and plant fossils while they were outside the GSENM boundary.

The number of paleontology-specific exhibits or other interpretive materials or events has been stable since 2000, when the first GSENM paleontologist was hired. The exception is Cottonwood Canyon Oyster Beds, which was temporarily removed from GSENM from 2019 to October 2021 (BLM 2020b). Within the current GSENM, all five of the in situ fossil sites, which were originally dedicated for public visitation and supported by interpretation, signage, and other publicly available information, remain. The higher the number of exhibits, interpretive material, events, and in situ sites, the more effective the outreach and interpretation, and the greater the public enjoyment.

Forecasts

Geological features that may need protection given increasing visitor trends in GSENM include the Devil's Garden and Wahweap hoodoos, the Cockscomb, and the Toadstools. Other special geological areas include arches, bridges, and slot canyons. Areas of high use include Navajo Sandstone slickrock between Boulder and Escalante and between the creeks off Skutumpah (Paria River Canyon). An increase in illegal hobby collecting may necessitate more aggressive law enforcement to curb the problem. Targets could include iron concretions, septarian nodules, agates, fossil oysters and ammonites, vertebrate fossils, and petrified wood.

Ongoing paleontological discoveries will continue to make invaluable contributions to the understanding of the earth's past. Given the general trend of current intensive paleontological resource management, the number of scientifically important fossil specimens in museums will increase, the number of scientific publications and described species will increase, public enjoyment and understanding of the unique nature of the resource should increase, and the protection of important in situ fossil sites should continue. Paleontological outreach efforts should also help counter looting and vandalism and lead to greater citizen stewardship. GSENM-specific paleontological guidance documents would help advance scientific goals and resource protection, preservation, and conservation. It is anticipated that additional curatorial space could be necessary to safely house newly collected specimens within the life of the plan.

3.8.2 Environmental Consequences

Refer to **Section F.13**, Paleontological and Geological Resources, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would proposed management decisions regarding paleontological resource management (such as curation, protection, survey, collection, outreach, and interpretation) impact paleontological resources, research communities, local communities, and visitor experiences?
- How would land use allocations and discretionary uses impact paleontological resources?
- How would land use allocations and discretionary uses impact unique geological features?

The analysis qualitatively and quantitatively reviews existing data and current paleontological resources' conditions and trends, intersects PFYC units with land use allocations under each alternative, and quantitatively or qualitatively assesses the degrees of impact associated with different disturbance levels. For unique geological features, the analysis intersects select geological formations that contain these unique

geological features with defined alternative footprints and quantitatively or qualitatively discusses the potential for impacts by alternative.

The geographical scale for the paleontological analysis is the decision area. The geological analysis area is the unique features of mapped exposed bedrock, which contains the unique geological features identified in Proclamation 10286, such as the numerous named natural bridges and arches, slot canyons, hoodoos, and other formations. The temporal scale for both is the life of the plan.

Assumptions

- Documentation and potential excavation would allow for research and interpretive uses.
- Public education would increase the public's awareness of the need for protection.
- Geologic unit PFYC designations within the GSENM decision area are based on previous paleontological resource assessments, and these adequately reflect the potential for known and unknown paleontological resources. Previously recorded sites are concentrated within PFYC Class 4 and 5 geologic units (such as the Kaiparowits Formation, lower Wahweap Formation, and Tropic Shale).
- Paleontological site data, while important to the understanding of the affected environment, are not comprehensive; also, each record is not equivalent (for example, ranging from fossil fragments to quarries that take multiple years to excavate). Therefore, for management planning purposes, the BLM primarily uses the acres by PFYC rating.
- Ground-disturbing activities in areas with high and very high PFYC ratings are likely to disturb significant fossils.
- Once impacted, paleontological resources cannot return to their original condition, and they lose important contextual data and scientific value.
- Unique geological features such as arches, canyons, hoodoos, and cliffs are limited to areas mapped as the Naturita Formation, Entrada Sandstone (Formation), Navajo Sandstone, and Page Sandstone.
- Once impacted, geological features are not likely to return to their original condition.

Impacts Common to All Alternatives

Under all alternatives, adherence to the Proclamation; existing laws, such as the Paleontological Resources Preservation Act of 2009; and BLM policies (for example, manuals and handbooks) would manage to protect paleontological resources within the decision area. Continued scientific work by qualified researchers on BLM-managed land would add further knowledge about the area's paleontological resources, resulting in opportunities for improved future management decisions and protection of these nonrenewable resources. While specific goals, objectives, and management direction vary slightly between Alternative A and Alternatives B, C, and D, many of the key elements are the same. These include a focus on public access and the identification of paleontological sites and specimens appropriate for research, protection, conservation, and interpretation (or public access).

Under all alternatives, management direction includes a focus on proactive inventory and conservation research or interpretation within geologic units mapped as PFYC Classes 4 and 5. Under all alternatives, the BLM will develop a paleontological resources plan. The plan would focus on management (that is, Alternative A) or management and implementation (that is, Alternatives B, C, and D).

Coordination with academic institutions, interested stakeholders, and appropriate state and local governments, including counties and municipalities, would be consistent under all alternatives. Under all alternatives, management would focus on the development of a consistent PFYC system throughout the decision area and protocols for the inventory, collection, and protection of paleontological resources; public involvement; community interpretation; and monitoring of conditions and trends. While the components of the plan would also be similar for Alternative A and Alternatives B, C, and D, Alternatives B, C, and D specifically also would mention the development of a catalog of field locations of baseline inventories, annual inventory monitoring and collection, and development of site security plans and collection management strategies.

The BLM would consider the mitigation of impacts on paleontological resources in management decisions under all alternatives. Actions that could affect paleontological resources would be assessed (for example, prior to any surface disturbance), and the following would be undertaken: an assessment, including determining the PFYC of geological units involved in the activity; a compilation of known paleontological resources in the area; and a consideration of potential effects based on the nature of the activity. Consistent with BLM guidelines, activities that would disturb the geologic units of PFYC Class 4 or higher would typically require an on-the-ground evaluation by a qualified paleontologist. Additionally, activities that would disturb the geologic units with PFYC Classes 3 and U also may require this evaluation based on BLM guidelines. Once this assessment is completed, a mitigation plan would be developed to protect paleontological resources; this plan would include avoidance, pre-disturbance salvage, professional monitoring during construction, and stop-work authorizations if paleontological resources are uncovered.

Increased awareness and opportunities for hands-on education for paleontological resources have increased the potential for the long-term preservation of unique and important paleontological resources. By collaborating with local communities, universities, and museums, the BLM can assist in developing areas for public casual collecting of paleontological resources, such as common invertebrates, shells, silicified wood, and leaves, on BLM-managed land. These educational activities should be diverse and inclusive in nature while informing the public on the preservation and protection of paleontological resources through applicable laws, regulations, and policies that protect these resources. The BLM would develop specific plans for areas rich in common and collectible paleontological resources such that the impacts would be limited while still providing opportunities for fossil collecting for curation and research purposes, and for casual collection in adherence with the exercise of religion under the Religious Freedom Restoration Act, and facilitating active public engagement and further research in the planning and decision areas. This would improve the overall knowledge and stewardship of these resources.

All alternatives generally limit the extent of surface disturbance in GSENM (for example, withdrawn from mineral entry and no casual collection). Along with general paleontological management, all alternatives are anticipated to support the proper care and management of GSENM paleontological objects by limiting new major development and disturbance in GSENM.

Under all alternatives, any management decisions that include increased areas of allowed surface disturbance, such as construction, ROW leasing, increases in recreation, and increases in OHV use, could affect paleontological resources. Unmitigated surface-disturbing activities could dislodge or damage paleontological resources and features that were not visible before surface disturbance. Crushing, breaking, or displacement of paleontological resources could result in the permanent loss of the resources, the scientific data they could provide, and the associated contextual data. Where surface disturbance is

not mitigated or reclaimed, paleontological resources may be subjected to long-term damage or destruction from erosion. If surface disturbance is regulated and proper mitigation and preservation processes are followed, these activities could expose scientifically significant fossils that would otherwise remain buried and unavailable for scientific study.

Actions that provide further human access to BLM-managed lands and lead to activities like vandalism and unauthorized collection could also impact paleontological resources. These impacts can be reduced through actions such as enforcement of existing laws, resource monitoring, and mitigation that may include limiting or regulating access. With programs targeted toward education and outreach, the impact of human recreation on paleontological resources can be limited. Additionally, through the discovery of previously unknown paleontological resources, positive impacts can occur on these resources if proper laws are followed and authorities are notified. Such fossils, if collected properly and curated into the museum collection of a qualified repository, would be available for future scientific study and education.

If surface-disturbing activities and human use are unmitigated, they could also impact unique geological features. However, mitigation for impacts on unique geological features is usually included at the implementation level. Without mitigation, these features could be permanently altered or modified if they shift, move, or crack due to changing conditions from ground disturbance or visitor use. The balanced pedestal rock formations known as hoodoos can be particularly vulnerable to damage due to their delicate nature. Features such as these can be knocked over by equipment or by vandals. Larger features, such as arches and bridges, are generally less susceptible to impacts brought about by landscape-level management actions. The potential for impacts on any kind of geological feature varies by alternative, depending on the overlap of ground disturbance or visitor use areas with geologic units that contain these features.

Per the Proclamation, disposal of lands within GSENM is not allowed, except possibly by exchange that furthers the protective purposes of GSENM. Thus, to complement or enhance existing GSENM objects, land exchange and land acquisition from willing landowners may occur under all alternatives. If BLM-managed lands are disposed of and removed from federal ownership, they no longer retain any BLM protection for paleontological resources. Paleontological resources on land that will be retained (or acquired) by the BLM will be protected by federal laws and policies protecting paleontological resources on BLM-managed lands.

Areas open for ROW authorization could have more ground disturbance from possible surface-disturbing activities than areas with ROW avoidance or exclusion areas. To reduce the potential for impacts on paleontological resources from ROW actions, paleontological resource evaluations and subsequent mitigation could be completed.

Construction of structures to support livestock grazing (for example, stock ponds, dams, and roads) would increase surface disturbance and could impact paleontological resources. Also, livestock grazing reduces vegetation within an area and could cause increased erosion of the soil and exposure of paleontological resources underlying the area. Livestock also could trample and destroy any paleontological resources if these resources are present at or near the surface.

Managing and protecting natural environments and ecosystems (for example, soils, vegetation, forests, riparian areas, floodplains, and WSAs) and wildlife habitats can further reduce erosion within these environments and thereby decrease impacts on paleontological resources. In some cases, management of these other resources may require additional assessment prior to paleontological excavation (for example,

on slopes greater than 30 percent) or after an excavation is initiated, but not completed, within a specific period (2 or 3 years).

Wildfires can adversely affect surface and shallowly buried paleontological resources, especially when they occur on steep slopes where vegetation has been previously burned. In such cases, soil stability is compromised, causing a higher chance for increased erosion. Fire and fuels management may reduce this risk of direct and indirect impacts on paleontological resources from wildfire, but vegetation management that include ground disturbance can directly impact paleontological resources. The magnitude would vary by alternative depending on the methods authorized.

Visual resource management decisions could indirectly impact paleontological resources in specific areas. Where minimal visual change from human activity is allowed (VRM Class I), known and unknown paleontological resources are less likely to be impacted from these activities. Areas where major modifications of the existing landscape are allowed (VRM Class IV) have a higher potential for ground-disturbing activities, increased human activity, and impacts on paleontological resources. The greatest impact—positive or negative—on paleontological resources from VRM management decisions would be in PFYC Class 4, 5, or U areas. The BLM would manage impacts as previously discussed for surface disturbance and increased human activities.

Areas managed for recreation, such as SRMAs, RMZs, and ERMA, could have increased risk for direct, indirect, and inadvertent damage to paleontological resources from concentrated recreation and increased localized visitor use. Recreational activities can physically alter exposed or shallow paleontological resources, leading to damage from erosion and unauthorized collection and vandalism. However, specifically because these risks occur in concentrated areas like trails, GSENM managers may be able to better manage recreation in ways that minimize the potential for damage to paleontological resources than in other unregulated recreation areas where effects are more difficult to anticipate, monitor, and mitigate.

Prior to the creation or expansion of areas managed and developed for specific recreation, a paleontological resource assessment would evaluate the underlying geologic units for the paleontological potential and address further needed assessment or mitigation. Impacts within areas managed for recreation could be further mitigated through limited OHV travel, monitoring of hiking and biking trails, and designating camping areas, especially in or near geologic units with PFYC Classes 4 and 5. Overall, recreational use can improve knowledge of paleontological resources if federal laws, regulations, and policies are followed, and the public is educated on these processes.

Given current visitor trends, human activity will increase within the decision area both in and out of areas formally managed for recreation. These increased actions could uncover previously unknown paleontological resources; if the discoveries are handled properly, they could add to the paleontological knowledge of the region. However, this process would rely on BLM-supported community engagement and education on the preservation of the resource.

Land with special designations, RNAs, are afforded special management measures designed to protect a variety of resource values. Since this management typically results in regulated use and limits human-caused surface disturbance, these decisions could also protect potential paleontological resources within these areas. All alternatives would include the No Mans Mesa RNA (ACEC) (2,800 acres). This RNA (ACEC) contains only geologic units with PFYC Classes 2 (96 percent of the area) and 3 (4 percent of the

area); it does not include any PFYC Class 4 or 5 geologic units. Thus, the additional protection for paleontological resources is limited.

Like areas with stringent VRM classifications, special designation areas, including ACECs, WSAs, ISAs, and WSRs, are afforded special management measures designed to protect a variety of resource values. Management measures vary but generally include stringent VRM classifications, surface use restrictions, ground disturbance restrictions, motorized and OHV travel prohibitions, annual monitoring, and other restrictions on development and resource use, including impacts on the soundscape (that is, the maximum decibels (dBA) permitted at facilities). Thus, management of these areas would further regulate use and overall would limit human-caused surface disturbance.

Paleontological resources in these areas would be preserved in situ or would be collected only through an approved paleontological resources use permit. New discoveries from development would be less likely than in other portions of the decision area, but permits for scientific uses would be considered if these uses are compatible with the resource values that the designation is protecting. Potentially, using mechanical tools for fossil excavation may result in dBAs exceeding the maximum allowed for a period of time. The allowed dBAs vary by alternative.

Management of WSRs specifically would help to reduce erosion and help the rivers maintain their natural channel. Under all alternatives, designated WSRs cross less than 1 percent of the decision area (202 acres), and the geologic units and associated PFYC values do not vary by alternative. Under all alternatives, 47 percent of the decision area (881,100 acres) is designated as ISAs and WSAs. Since these locations do not vary by alternative, the potential for impacts on paleontological resources based on paleontological resource potential (that is, the PFYC) does not vary by alternative.

Alternative A

Under Alternative A, the BLM would continue to manage paleontological resources in accordance with the 2020 Approved RMPs, except where those management decisions do not align with the Proclamation. Under Alternative A, there are no defined goals, objectives, or management directions that discuss geological resources (or unique geological features).

Management for other resources may have an impact on paleontological resources. For example, vegetation management direction under Alternative A includes the full range of treatment methods and tools authorized. These methods can result in ground disturbance and could impact paleontological resources if the treatments are performed in areas of high paleontological potential (for example, PFYC Classes 4 and 5).

Under Alternative A, 34 percent of BLM-managed land in the decision area would be open to ROW authorization, including 24 percent (254,700 acres) of areas with PFYC Classes 4 and 5. Of the remaining PFYC Classes 4 and 5 areas within the decision area, 56 percent (588,500 acres) would continue to be within ROW exclusion areas and 19 percent (204,000 acres) would continue to be in ROW avoidance areas with limited or no surface disturbance or potential disturbance of paleontological resources.

Within the 2 ERMAs, 10 RMZs, and 5 SRMAs that cover the entire decision area under Alternative A, most (98 percent) PFYC Classes 4 and 5 areas are in one of the two ERMAs. In these ERMAs, management would be interdisciplinary; recreation would have the same value as other resource uses. While SRMAs are like ERMAs in that management focuses on recreation, in SRMAs, the predominant land use focus of

the area and management may place restrictions on other resource uses. The potential for impacts on unknown paleontological resources increases with the amount of area and the PFYC value of the geologic unit exposed within the recreation area. The potential also varies by the type and intensity of recreation uses and development. For example, continued surface disturbance, followed by subsequent erosion, from such ground-disturbing activities as OHV open travel could have a negative impact on unknown paleontological resources in these areas.

Under Alternative A, nearly the entire decision area would have OHV travel limited to existing and designated routes, including nearly all the PFYC Classes 4 and 5 areas (914,200 acres). Under Alternative A, a small portion of the decision area would continue to be open with no limitations, and a small portion would continue to be closed to all OHV travel. Nearly 2,000 acres of PFYC Class 4 areas would continue to be open to all travel, but no PFYC Class 4 or 5 areas would be closed to travel. Keeping OHV travel closed in areas, especially those with underlying rock units of PFYC Classes 4 and 5, would reduce both surface disturbance and human impacts on paleontological resources. Limiting OHV travel to existing and designated routes would limit new areas of erosion and surface disturbance in geologic units with PFYC Classes 4 and 5; however, this could increase public access to these areas, which could increase the impact on paleontological resources. Community outreach and education on identifying fossils and notifying authorities if paleontological resources are found may reduce the impact on these resources.

Under Alternative A, 1,030,500 acres of PFYC Classes 4 and 5 would continue to be open for grazing. These areas could have increased erosion from surface disturbance through construction of support structures (for example, stock ponds, dams, and roads) or from the trampling and reduction in vegetation from grazing.

As previously noted under *Effects Common to All Alternatives*, the protection of other resources through management decisions, such as VRM, could reduce potential impacts on paleontological resources. VRM Class IV areas would have the least indirect protection for known and unknown paleontological resources. VRM Class I areas would have the most protection. Under Alternative A, 54 percent (490,200 acres) of areas with PFYC Classes 4 and 5 are in VRM Class I areas; 13 percent (115,200 acres) are in VRM Class II areas; 20 percent (185,400 acres) are in VRM Class III areas; and unlike all other alternatives, 14 percent (125,300 acres) are in VRM Class IV areas. Under Alternative A, VRM offers the lowest potential for reduced impacts on paleontological resources; this is because it has the least amount of VRM Classes I and II acres and is the only alternative to have VRM Class IV areas.

Under Alternative A, of the 377,500 mapped acres of geologic units with critical geological features, 72 percent are ROW avoidance or exclusion areas, and 28 percent are open to ROWs. Ninety-nine percent are within areas open to OHV travel or limited to existing and designated routes; 93 percent of the acres are within VRM Class I or II management areas. Additionally, all these acres are also included in two ERMAs (87 percent), multiple RMZs (3 percent), or SRMAs (10 percent). Areas open for ground disturbance and concentrated recreation increase the potential for intentional or inadvertent impacts on the unique geological features that may overlap these resource uses. Management of recreation types and locations and limitations to surface disturbance because of other resource management decrease the potential for adverse effects on unique geological features.

Alternative B

The effects under Alternative B would be the same as those described under Alternative A except for the descriptions noted below.

Under Alternative B, the BLM would not continue to manage paleontological resources in accordance with the 2020 Approved RMPs. While similar to Alternative A, Alternative B includes slightly more emphasis on developing protocols, implementation plans, and management strategies. Management direction for Alternatives B, C, and D would be to identify geological sites appropriate for public access and proactively maintain an annual program of inventory, monitoring, and, where appropriate, collecting and curating geological resources with a focus on areas identified in the Proclamation.

Under Alternative B, management for other resources could have an impact on paleontological resources. For example, vegetation management direction under Alternative B would prohibit noise-generating facilities in WSAs, lands with wilderness characteristics, RNAs (ACECs), and ACECs; in the remainder of the decision area, Alternative B would allow a maximum 75 dBA for short-term human-caused noise and below 55 dBA at no more than 50 feet from the source for long-term human-caused noise. The BLM would require sound-attenuation features for facilities that are approved to generate noise. Unless there are research or administrative allowances, this level of noise restriction could limit or eliminate the use of mechanical tools frequently needed for fossil excavations (for example, jackhammers and rock saws).

Under Alternative B, the BLM would open 29 percent less of the decision area to ROW authorization than under Alternative A, including 20 percent less (43,500 acres) of PFYC Classes 4 and 5 areas. Of the remaining 96 percent (892,600 acres) of areas with PFYC Classes 4 and 5, 34 percent would be within ROW avoidance areas and 61 percent would be within ROW exclusion areas; this is 20 percent (or 211,400 acres) more than under Alternative A. Potential impacts on paleontological resources from ROW authorizations would be limited or eliminated in these areas under Alternative B.

The RMAs (eight ERMAs, six SRMAs, and three RMZs) under Alternative B, like under Alternative A, cover the decision area and include the majority (99 percent) of PFYC Classes 4 and 5 areas. Based on the recreation area type alone, impacts on paleontological resources would be like those under Alternative A; most of the decision area would be included in an ERMA where management is interdisciplinary, and recreation would have the same value as other resources or resource uses. As previously noted, surface disturbances related to human use and development in recreation areas could impact paleontological resources, depending on the type, intensity, and PFYC value of the area impacted. Since management of these types of impacts vary between ERMAs, these differences in management are generally discussed for each specific resource or use (for example, ROWs and OHV use).

Unlike under Alternative A, under Alternative B, no lands would be managed as OHV open areas. Instead, the BLM would manage the entire area as closed or open with travel limited to existing and designated routes. This includes 58 percent and 42 percent of PFYC Classes 4 and 5 areas within the decision area, respectively. As noted previously, travel on existing and designated routes would limit new areas of erosion and surface disturbance, and closing areas to OHV use would further limit impacts. The potential for OHV-related impacts under Alternative B would be lower than under Alternative A because all acres closed under Alternative B would be open or open with limited travel under Alternative A.

Compared with Alternative A, land available for livestock grazing under Alternative B would decrease with 64,000 fewer acres of PFYC Classes 4 and 5 areas (or 6 percent less of the total PFYC Classes 4 and 5 areas in the decision area). Closed areas could have decreased impacts from grazing management decisions relative to Alternative A.

Under Alternative B, 83,700 acres of the decision area would be within two designated ACECs and four RNAs (ACECs) that would include 6 percent of PFYC Classes 4 and 5 areas (57,600 acres) within the decision area. As described in *Effects Common to All Alternatives*, any potential paleontological resources within the boundaries of these ACECs or RNAs (ACECs) would have added protection through management that regulates use and limits human-caused surface disturbance. Unlike under Alternative A, PFYC Classes 4 and 5 areas would be included within ACECs or RNAs (ACECs). Thus, there would be increased protection of paleontological resources contained within the boundaries of these designated areas.

Under Alternative B, 4 percent more of PFYC Classes 4 and 5 areas would be in VRM Class I areas, and 8 percent more would be in VRM Class II areas than under Alternative A. There would be no VRM Class IV areas. Human activities would be less likely to impact additional PFYC Classes 4 and 5 acreages in VRM Class I and II areas under Alternative B than under Alternative A, where they would be within VRM Class IV areas.

Unlike Alternative A, which would not include areas to be managed to protect wilderness characteristics, under Alternative B, the BLM would manage 5 percent of PFYC Classes 4 and 5 areas (44,200 acres) within the decision area to protect wilderness characteristics. Protecting lands with wilderness characteristics over all other uses would, in turn, help protect paleontological resources by severely limiting the area from most human surface-disturbing activities. Minimizing the impacts on lands with wilderness characteristics while emphasizing multiple uses would help to reduce impacts on paleontological resources by limiting, reducing, and excluding areas for surface-disturbing activities. These restrictions could also limit the BLM's ability to authorize the excavation of paleontological resources.

Under Alternative B, of the 377,500 mapped acres of geologic units that have critical geological features, 24 percent less would be open to ROWs (a total of 5 percent) than under Alternative A; 95 percent would be managed as ROW avoidance or exclusion areas. Also, 65 percent more would be closed to OHV travel than under Alternative A. The BLM would manage the remaining 35 percent as travel limited to existing and designated routes. Additionally, like under Alternative A, 94 percent would be within VRM Class I or II areas. Additionally, all these acres would also be included in multiple ERMA (85 percent) and RMZs (15 percent) under Alternative B. Overall, compared with Alternative A, fewer acres of geologic units that contain critical geological features would be within areas of potential ground disturbance. Impacts from recreation would be similar. However, with more focused recreation under Alternative B than under Alternative A, the impacts could be more concentrated.

Alternative C

The effects under Alternative C would be the same as those described under Alternative A except for the descriptions noted below.

Under Alternative C, the decision area would be divided into four areas; resource management would vary between areas, with generally the most restrictions for ground-disturbing uses in the primitive areas

and the least restrictive actions in the front country area. These management decisions could impact paleontological resources positively or negatively depending in part on the PFYC values of the area. The amount of areas with PFYC Classes 4 and 5 varies between areas, as the total acreage of each area varies. The majority (75 percent, or 685,600 acres) would be in the primitive country area, 24 percent would be in the outback area, 2 percent would be in the passage area, and the remaining 1 percent would be in the front country area.

Because management specific to paleontological resources would be the same as under Alternative B, the related impacts on paleontological resources would be the same as those described under Alternative B. Under Alternative C, management for other resources could impact paleontological resources. For example, unlike Alternative A, but like Alternatives B and D, Alternative C would prohibit noise-generating facilities in specific areas (primitive and outback areas) and limit the maximum dBA allowed for short-term (below 75 dBA and not to exceed 10 dBA at 50 feet from the source) and long-term (that is, below 55 dBA at no more than 50 feet from the source) human-caused noise elsewhere (front country and passage areas). Unless there are research or administrative allowances, this level of noise restriction could limit or eliminate the use of mechanical tools frequently needed for fossil excavations (for example, jackhammers and rock saws).

Vegetation management direction that could impact paleontological resources under Alternative C would be the same as described under Alternative B.

Under Alternative C, the BLM would open 33 percent less of the decision area to ROW authorization than under Alternative A, including 23 percent less of PFYC Classes 4 and 5 areas (or a total of 6,200 acres). Most areas with PFYC Classes 4 and 5 (75 percent, or 787,800 acres) would be within ROW exclusion areas, and 24 percent would be within ROW avoidance areas; this is 24 percent (or 248,800 acres) more than under Alternative A. Potential impacts on paleontological resources from ROW authorizations would be limited or eliminated in these areas under Alternative C.

Under Alternative C, the RMAs (8 ERMAs and 14 SRMAs) would cover only 48 percent of the decision area (unlike under Alternatives A or B) and include 525,200 acres (or 50 percent) of PFYC Classes 4 and 5 areas. Impacts from managed recreation would occur in a more localized area under Alternative C than under Alternatives A or B; however, the types of impacts would be consistent. Where quantitative information is available, these types of impacts are discussed by specific resource or use (for example, ROWs and OHV use).

Under Alternative C, no lands would be managed as OHV open areas; instead, the BLM would manage the entire area as closed or open with travel limited to existing and designated routes. This includes 75 percent of areas with PFYC Classes 4 and 5 within the decision area closed to OHV use, which is 76 percent more than under Alternative A. The remaining 25 percent of PFYC Classes 4 and 5 areas would be open with limited travel. As noted previously, travel on existing and designated routes would limit new areas of erosion and surface disturbance. The potential for OHV-related impacts under Alternative C would be lower than under Alternative A because all areas closed under Alternative C would be open or open with limited travel under Alternative A.

Compared with Alternative A, land available for livestock grazing would decrease under Alternative C, with 64,000 fewer acres of PFYC Classes 4 and 5 areas (or 6 percent less of the total PFYC Classes 4 and

5 areas in the decision area). Closed areas could have decreased impacts from grazing management decisions relative to Alternative A.

Unlike under Alternative A, under Alternative C, 83,700 acres of the decision area would be within four RNAs (ACECs), which include 4 percent of the PFYC Classes 4 and 5 areas (39,200 acres) that are within the decision area. As described in *Effects Common to All Alternatives*, any potential paleontological resources within the boundaries of these RNAs (ACECs) would have added protection through management that regulates use and limits human-caused surface disturbance. When compared with Alternative A, there would be increased protection within the boundaries of RNAs (ACECs) and the potential paleontological resources they contain.

Under Alternative C, 15 percent more areas with PFYC Classes 4 and 5 would be in VRM Class I areas; 14 percent more would be in VRM Class II areas; and 15 percent fewer would be in VRM Class III areas than under Alternative A. There would be no VRM Class IV areas under Alternative C. Compared with Alternative A, human activities would be less likely to impact the additional PFYC Classes 4 and 5 acreage in VRM Classes I and II areas under Alternative C; this is because those acres would be within VRM Class IV areas under Alternative A.

Unlike Alternative A, Alternative C would include areas to be managed to protect and minimize impacts on lands with wilderness characteristics. Protecting lands with wilderness characteristics over all other uses would, in turn, help protect paleontological resources by severely limiting the area from most human surface-disturbing activities. Minimizing the impacts on lands with wilderness characteristics while emphasizing uses would help to reduce impacts on paleontological resources by limiting, reducing, and excluding areas for surface-disturbing activities. These restrictions could also limit the BLM's ability to authorize the excavation of paleontological resources. Under Alternative C, 19 percent (172,600 acres) of the areas with PFYC Classes 4 and 5 within the decision area would be managed to minimize impacts, and 10 percent (or a total of 135,600 acres) of the PFYC Classes 4 and 5 areas in the decision area would be managed for protecting lands with wilderness characteristics. Thus, the restrictions on disturbance and protection for potential paleontological resources would be greater under Alternative C than under Alternative A.

Of the 377,700 mapped acres of geologic units that have critical geological features, under Alternative C, 27 percent would be in the outback area, 2 percent would be in either the front country or passage areas, and 69 percent would be in the primitive area. Due to more restrictive management of the outback and primitive areas, geological features would have increased protection and a decreased potential for impacts than those with fewer restrictions and easier access. There would be no similar divisions under Alternative A.

In addition, under Alternative C, of the acres of mapped geologic units that have critical geological features, 28 percent more (or 100 percent) would be managed as avoidance or exclusion areas compared with under Alternative A; this is because no areas would be managed as open to ROWs. Seventy-one percent more acres would be closed to OHV travel than under Alternative A, and the remaining 29 percent would be managed as travel limited to existing and designated routes. Under Alternative C, 97 percent of the decision area would be within VRM Class I or II management areas, which is slightly higher than under Alternative A. Additionally, 82 percent would be included in multiple ERMAs (46 percent) and SRMAs (36 percent) under Alternative C. Overall, compared with under Alternative A, fewer acres of geologic units that contain critical geological features would be within areas of potential ground disturbance. Impacts

from recreation would be similar to those described under Alternative A. However, with more focused recreation under Alternative C than Alternative A, the impacts could be more concentrated.

Alternative D

Effects under Alternative D would be the same as those described under Alternative A except for the descriptions noted below.

Under Alternative D, the maximum dBA outside developed campgrounds is not to exceed 10 dBA above the L90 measured background sound at no more than 50 feet from the source. Some noise generation would be allowed in WSAs, lands with wilderness characteristics, RNAs (ACECs), and ACECs. However, unless there are research or administrative allowances, this level of noise restriction could limit or eliminate the use of mechanical tools frequently needed for fossil excavations (for example, jackhammers and rock saws).

Group size would also be limited under Alternative D, which would follow RMA prescriptions, where applicable, and be limited to 12 individuals. This limit is slightly less than half of the default allowed under Alternative A. One major difference under Alternative D is that unlike Alternative A, Alternative D would not specify that exceptions would be considered on a case-by-case basis approved by the BLM Authorized Officer. This could limit the size of paleontological field teams in some areas.

Vegetation management direction under Alternative D would be more restrictive than under Alternative A. Under Alternative D, the BLM would prioritize natural processes and techniques, which is expected to result in less ground disturbance than the full range of treatment methods and tools authorized under Alternative A. These more restrictive methods could reduce the potential impact on paleontological resources if the treatments are in areas of high paleontological potential (for example, PFYC Classes 4 and 5).

Unlike under Alternative A, areas of PFYC Classes 4 and 5 would primarily be managed as ROW exclusion under Alternative D. Of the 916,400 acres of currently mapped areas of PFYC Classes 4 and 5 within the decision area, nearly all (more than 99 percent) would be managed as ROW exclusion. Potential impacts on paleontological resources from ROW authorizations would be eliminated in these areas under Alternative D. The remaining less than 1 percent would be PFYC Class 4 and within areas designated as open to ROWs (900 acres) or ROW avoidance (6,400 acres).

The RMAs (4 ERMAs and 10 SRMAs) under Alternative D would cover the least amount of the decision area (22 percent) and include 279,200 acres (or 27 percent) of PFYC Class 4 and 5 areas. Under Alternative D, impacts from managed recreation would have the potential to occur in less area than under Alternative A; however, the types of potential impacts would be the same as those described under Alternative A (for example, from, OHVs, and vandalism or unauthorized fossil collection).

As compared with Alternative A, Alternative D would have more acres managed as closed to OHVs, including 875,800 acres of mapped PFYC Classes 4 and 5 geologic units, which the BLM would manage as closed to OHVs instead of open to OHVs or OHVs limited to designated routes. This additional management would add additional protection to potential paleontological resources in these areas compared with Alternative A.

When compared with Alternative A, management under Alternative D would decrease land available for livestock grazing, including 495,000 fewer acres of PFYC Classes 4 and 5 geologic units (or 47 percent less of the total PFYC Classes 4 and 5 units in the decision area). Compared with Alternative A, these areas closed to grazing could have decreased impacts from grazing management decisions. Even with decreased acreage, under Alternative D, nearly 50 percent of the lands open to grazing would be in areas with PFYC Classes 4 and 5. Impacts of grazing on paleontological resources in these areas would be the same as those described under Alternative A.

Alternative D is different from Alternative A because there would be no VRM Class III or VRM Class IV areas. Under Alternative D, 34 percent more of the PFYC Classes 4 and 5 areas within the decision area would be in VRM Class I areas than under Alternative A, and the same amount would be in VRM Class II areas. Human activities would be less likely to impact the additional PFYC Classes 4 and 5 acreage in VRM Class I areas under Alternative D compared with under Alternative A, where those acres would be within VRM Class III or IV areas.

Unlike Alternative A, Alternative D would include areas to be managed to protect impacts on lands with wilderness characteristics. Of the areas designated PFYC Classes 4 and 5 within the decision area, 34 percent (308,200 acres) would be managed to protect impacts on lands with wilderness characteristics under Alternative D. Thus, the restrictions on disturbance and protection for paleontological resources would be greater under Alternative D than under Alternative A. The potential for overlap of paleontological excavations and lands with wilderness characteristics would also be greater, potentially limiting excavations.

Under Alternative D, of the 377,700 mapped acres of geologic units that have critical geological features, 28 percent more would be managed as avoidance (10 percent) or exclusion (90 percent) than under Alternative A. This is because no areas would be managed as open to ROWs. Also, 85 percent more would be closed to OHV travel than under Alternative A, and the remaining 15 percent would be managed as travel limited to existing and designated routes. Unlike under Alternative A, 80 percent of units with critical geological features would be within VRM Class I or II management areas, and none would be managed as VRM Class III or IV areas.

Additionally, 57 percent of units with critical geological features would be included in multiple ERMA (11 percent) and SRMA (46 percent) under Alternative D. These geologic interest areas would comprise a larger portion (50 percent versus 20 percent) of the overall RMAs under Alternative D than under Alternative A. This is likely due to the emphasis in some recreation areas partly on geologic resource objects (for example, the Toadstools SRMA and Wahweap Hoodoos White Rocks). Overall, fewer acres of geologic units that contain critical geological features would be within areas of potential ground disturbance under Alternative D than under Alternative A. Impacts from recreation would be similar but with more focused recreation under Alternative D than under Alternative A. The impacts and monitoring efforts associated with recreation under Alternative D could be more concentrated.

Cumulative Impacts

The cumulative impacts analysis area for paleontological and geological resources is the planning area. Since paleontological resources are nonrenewable, impacts are permanent. The affected environment description captures the cumulative impacts of past and present actions on paleontological and geological resources in the planning area. Impacts include destruction or loss of paleontological resources and unique

geological features through ground disturbance associated with development projects and OHV use. Impacts also include the destruction or loss of paleontological resources and unique geological features from recreation use with associated vandalism, or authorized and unauthorized collection of resources.

Reasonably foreseeable future actions with the potential to affect paleontological and geological resources are like past actions. In general, projects that result in increased development and recreational opportunities would increase the potential for cumulative impacts on paleontological resources and unique geological features and result in increased public access, which increases the potential for illegal fossil collection and vandalism. Cumulative effects on paleontological and geological resources from present and reasonably foreseeable actions (see **Appendix F**, Analytical Framework) could occur where these actions overlap areas with paleontological potential (for example, PFYC Classes 4 and 5) or areas with unique geological features. Any type of development projects would be expected to cause some surface disturbance and could impact paleontological resources, especially if they intersect geologic units with the potential to contain paleontological resources; this is because direct adverse impacts on paleontological and geological resources result from destruction due to surface-disturbing activities.

Actions that could contribute to cumulative impacts include road maintenance and improvement projects that could increase and improve access; buried pipelines, such as the Lake Powell pipeline; various transmission projects, such as the Buckskin to Fredonia Powerline and the Garkane Transmission ROW; and work within existing federal highway ROWs. Assessments and properly implemented mitigation, where applicable, would reduce or eliminate impacts on paleontological resources. In contrast, proposed paleontological excavations would beneficially affect paleontological resources by providing a mechanism for the recovery of paleontological resources in a manner that retains their scientific and educational value.

Impacts on paleontological and geological resources could also result from management decisions that increase public access and therefore increase the likelihood of the loss of paleontological resources and unique geological features through vandalism or unlawful collecting. Adverse, cumulative impacts could result from the incremental loss of paleontological resources, unique geological features, and the associated irretrievable loss of scientific information over time because of ground disturbance, vandalism, and both lawful and unlawful collection. Conversely, beneficial direct, indirect, and cumulative impacts on paleontological resources and unique geological features could result from management decisions that restrict surface-disturbing activities, close or limit travel and access, establish areas as special designations, conserve important specimens in publicly accessible museum collections, and inventory sites that facilitate mitigation and avoidance.

Under all alternatives, the BLM would evaluate paleontological resources and apply appropriate mitigation for any reasonably foreseeable projects within the decision area. Ongoing paleontological resources management within GSENM by the BLM's paleontology program provides baseline information through inventory, collection, and excavations that are used to evaluate and elevate cumulative impacts from management decisions. Additionally, outreach, education, and active site monitoring by the BLM's paleontology program also provide information and inform the public on mitigating impacts on paleontological resources and unique geological features.

3.8.3 References

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3.9 FISH AND WILDLIFE

The decision area supports complex and fragile ecosystems with fish and wildlife that have developed unique adaptations to the conditions of their environments. Typical of the Colorado Plateau, the highly diverse topography and vegetation of the decision area create important habitat for a range of invertebrate and vertebrate species, including mammals, fish, reptiles, amphibians, birds, and invertebrates.

The BLM works closely with the Utah Division of Wildlife Resources (UDWR) to manage habitat for fish and wildlife (including big game, upland game, waterfowl, migratory birds, small mammals, amphibians, mollusks, and reptiles) to achieve and maintain suitable habitat for desired population levels and distribution within the decision area. The UDWR is responsible for managing wildlife population levels for all fish and wildlife species, while the BLM is responsible for managing wildlife and fisheries habitat in a condition that will support desired levels of species. The BLM works cooperatively with the UDWR through habitat management and restoration to maintain and reestablish populations of species that have used the historic range within the decision area.

3.9.1 Affected Environment

Current Conditions

Fish

The decision area contains two major river systems that support fish populations: the Paria and Escalante and their tributaries. A tributary to the Colorado River, the Paria River is characterized as a warm-water system. One native fish species, speckled dace (*Rhinichthys osculus*), has been verified within the river system.

The Escalante River is also a tributary to the Colorado River and has both warm-water and cold-water habitats. Surveys of fish species richness in the Escalante River in Glen Canyon found both native and introduced fish species (Mueller et al. 1999). This study found three distinct fish communities: the middle portion, lower portion, and side canyons. The middle portion displayed an intact community of largely native fish (99 percent native species) while the lower portion and the side canyons were dominated (89 percent) by nonnative species (Mueller et al. 1999). Five native fish species were identified during fish inventories: speckled dace, flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*), roundtail chub (*Gila robusta*), and Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Eleven nonnative species were identified during these surveys: brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), brook trout (*Salvelinus fontinalis*), fathead minnow (*Pimephales promelas*), channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), red shiner (*Cyprinella lutrensis*), yellow bullhead (*Ameiurus natalis*), striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), and green sunfish (*Lepomis cyanellus*) (Mueller et al. 1999).

Speckled dace were the most abundant native species observed during these surveys. Colorado River cutthroat trout are present in the Escalante River drainage but are limited to cooler waters above and upstream of the decision area. Calf Creek, a tributary to the Escalante River, has nonnative brown trout (below the lower falls to the confluence with the Escalante River) and nonnative Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri*) throughout the system.

Aquatic habitats in the decision area also support a diverse assemblage of aquatic invertebrate species (Vinson and Dinger 2008). These organisms provide critical food sources for fish, birds, and mammals. Other habitat components important to healthy aquatic systems are stable riparian conditions, well-vegetated banks, and riparian zones with a multilayered canopy of woody and non-woody riparian vegetation. These features support the maintenance of water temperatures, facilitate dissipation of energy from storm runoff, and provide substrates for fish reproduction.

Wildlife and Habitat

Wildlife habitat needs vary significantly by species. It is generally understood that healthy and sustainable wildlife populations can be supported where there is a diverse mix of vegetation communities that supply structure, forage, cover, and other specific habitat requirements. The current conditions in this section are generalized and reflect inventories, museum records, and research conducted in GSENM.

Surveys for herptiles have been conducted yearly since 2016 in the general vicinity of GSENM. In 2021, surveys took place in Beaver, Garfield, Iron, Kane, Piute, San Juan, and Wayne Counties (Heyborne and Gardner 2021). These surveys identified six species of amphibians: Arizona tiger salamander (*Ambystoma mavortium nebulosum*), red-spotted toad (*Anaxyrus punctatus*), Woodhouse's toad (*Anaxyrus woodhousii*), canyon tree frog (*Hyla arenicolor*), plains leopard frog (*Lithobates blairi*), and Great Basin spadefoot (*Spea intermontana*); 12 lizards: western whiptail (*Aspidoscelis tigris*), plateau striped whiptail (*Aspidoscelis velox*), Great Basin collared lizard (*Crotaphytus bicinctores*), eastern collared lizard (*Crotaphytus collaris*), long-nosed leopard lizard (*Gambelia wislizenii*), greater short-horned lizard (*Phrynosoma hernandesi*), northern sagebrush lizard (*Sceloporus graciosus*), desert spiny lizard (*Sceloporus magister*), western fence lizard (*Sceloporus occidentalis*), eastern plateau fence lizard (*Sceloporus undulatus elongatus*), ornate tree lizard (*Urosaurus ornatus*), common side-blotched lizard (*Uta stansburiana*); and six snakes: striped whipsnake (*Coluber taeniatus*), Great Basin rattlesnake (*Crotalus oreganus lutosus*), desert night snake (*Hypsiglena*

chlorophaea deserticola), common kingsnake (*Lampropeltis getula*), Great Basin gopher snake (*Pituophis catenifer deserticola*), and western terrestrial garter snake (*Thamnophis elegans vagrans*).

The desert night lizard (*Xantusia vigilis*) and the common chuckwalla (*Sauromalus ater*) have not been observed during the five years of surveys, despite concerted efforts (Heyborne and Gardner 2021). All known locations for both species have been surveyed multiple times, but no observations were made. Historically, the desert night lizard has been observed both in the Glen Canyon and in GSENM (Persons and Nowak 2008). Previous observations in GSENM were very localized between Kelly Grade and Last Chance Creek along Smoky Mountain Road. Records of the common chuckwalla in the region are also rare, with only five observations during surveys from 2001 to 2003 in the adjacent Glen Canyon. Previous observations of the common chuckwalla in GSENM are also very localized, with observations only in lower Little Valley, Croton, and Last Chance Creek Canyons. The Arizona toad (*Anaxyrus microscaphus*) has also not been observed during recent surveys, although historical reports indicate the species' presence in GSENM. Heyborne and Gardner (2021) suggest these observations may constitute misidentified specimens.

During the 2020 and 2021 surveys, the plains leopard frog, a species not known to occur within Utah, was confirmed by multiple observations (Heyborne and Gardner 2021). However, they are likely not native, but a population introduced during the transport of fish to the Wahweap Hatchery. Occurrences have not been recorded outside of the Wahweap Wash, indicating the species has likely not moved to other areas in GSENM. As more inventories are conducted, it is possible that new occurrences and range extensions will be discovered.

There are over 200 species of birds in GSENM. Some are year-round residents, while most are present seasonally and are considered migratory. Raptor species known in GSENM include bald eagles (*Haliaeetus leucocephalus*), golden eagles (*Aquila chrysaetos*), California condors (*Gymnogyps californianus*), Swainson's hawk (*Buteo swainsoni*), and peregrine falcon (*Falco peregrinus*). Many neotropical (migratory) birds concentrate around the Paria and Escalante Rivers and other riparian corridors in the decision area, while others require upland habitat such as sagebrush (*Artemisia* sp.) or pinyon (*Pinus monophyla*) and juniper (*Juniperus osteosperma*). The decision area is in Bird Conservation Region 16, Southern Rockies/Colorado Plateau (USFWS 2021). The USFWS lists 13 bird species of conservation concern that have the potential to occur in the decision area (Table 3-52; USFWS 2022) and has identified these species as needing special conservation actions.

Table 3-52. Birds of Conservation Concern That Have the Potential to Occur in GSENM

Species	Scientific Name	Habitat	Potential for Occurrence in GSENM ¹⁸
Bald eagle	<i>Haliaeetus leucocephalus</i>	Large lakes and surrounding forests	Common scavenger in winter; no nesting
Clark's grebe	<i>Aechmophorus clarkia</i>	Large freshwater lakes and marshes	Rare; common near Lake Powell, Wide Hollow Reservoir
Black rosy-finch	<i>Leucosticte atrata</i>	High-altitude mountains	Rare
Black-chinned sparrow	<i>Spizella atrogularis</i>	Dry brushlands and chaparral	Rare
Cassin's finch	<i>Carpodacus cassinii</i>	Coniferous forests	Rare

¹⁸Lisa Church, BLM Kanab Field Office, Paria River District wildlife biologist, personal communication on August 4, 2022, regarding bird species in the decision area.

Species	Scientific Name	Habitat	Potential for Occurrence in GSENM ¹⁸
Evening grosbeak	<i>Coccothraustes vespertinus</i>	Coniferous forests	Rare
Grace's warbler	<i>Dendroica graciae</i>	Coniferous forests	Rare
Lesser yellowlegs	<i>Tringa flavipes</i>	Marshes and wetlands	Very Rare
Lewis's woodpecker	<i>Melanerpes lewis</i>	Ponderosa pine forests, higher elevations	Rare
Long-eared owl	<i>Asio otus</i>	Coniferous forests	Rare
Olive-sided flycatcher	<i>Contopus cooperi</i>	Boreal and coniferous forests	Rare
Pinyon jay	<i>Gymnorhinus cyanocephalus</i>	Piñon-juniper woodlands	Common
Virginia's warbler	<i>Vermivora virginiae</i>	Piñon-juniper woodlands	Common

Source: USFWS 2022

A literature and museum survey of GSENM mammals lists 82 confirmed contemporary species (including the big game species discussed below). As many as 24 rodent species are thought to occur in the decision area (Flinders et al. 2002). Rodents are the most represented group, and common rodents represented in the region include woodrats (*Neotoma* spp.), which are known for their storage and waste structures called middens; pocket mice (*Perognathus* spp.); kangaroo rats (*Dipodomys* spp.); chipmunks (*Tamias* spp.), pocket gophers (*Thomomys* spp.), and mice (*Peromyscus* spp.) (NPS 2007). Dr. David Willey of Montana State University recorded 12 distinct rodent species while conducting a Mexican spotted owl (*Strix occidentalis lucida*) prey study in the decision area (Willey and Willey 2010).

Black-tailed jackrabbit (*Lepus californicus*) and desert cottontail (*Sylvilagus audubonii*) are the only rabbit species in GSENM. Carnivorous mammals include black bear (*Ursus americanus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and mountain lion (*Puma concolor*). These species prey on rodents, birds, lizards, and other large mammals (Flinders et al. 2002). In addition, the decision area provides suitable habitat for raccoon (*Procyon lotor*), badger (*Mustelidae mephitidae*), long-tailed weasel (*Mustela frenata*), beaver (*Castor canadensis*), and upland game birds. The UDWR manages wildlife populations and hunting seasons. The decision area is in UDWR game management units 25C/26 and 27.

Sixteen bat species have been observed in GSENM (Flinders et al. 2002 and recent capture data¹⁹), including pallid bat (*Antrozous pallidus*), big brown bat (*Eptesicus fuscus*), little brown myotis (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), western pipistrelle (*Parastrellus larkia*), and Brazilian free-tailed bat (*Tadarida brasiliensis*). Bats in GSENM include both year-round residents and migrants. Bats roost alone or in colonies in the cliffs and canyon walls during the day and emerge at dusk to hunt for insects.

As stated in Proclamation 10286, GSENM supports a high diversity of native bee species, with over 600 species identified to date. This high diversity is likely due to the substantial elevation gradient, diversity of flowering plants that provide forage, and the various vegetation communities that provide suitable habitat. Many of these species are likely endemic to the GSENM region.

Game animals provide an important recreation and economic benefit through hunting and wildlife-viewing. Game populations in the area consist of desert bighorn sheep (*Ovis canadensis larki*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), and elk (*Cervus canadensis*).

¹⁹Cameron McQuivey, BLM GSENM wildlife biologist, personal communication on July 6, 2022, regarding bat species in the decision area.

Bighorn Sheep

In partnership with local conservation groups, the UDWR has reintroduced and supplemented populations of desert bighorn sheep in Utah since 1973. Since that time, over 1,000 desert bighorn sheep have been released in areas of historical habitat (UDWR 2018). There are 546,800 acres of year-long crucial habitat for desert bighorn sheep found throughout the decision area (BLM GIS 2022; **Figure 3-31, Appendix A**). An additional 8,600 acres of substantial habitat have also been identified. The largest intact crucial habitat extends southwest from the Straight Cliffs to U.S. Highway 89. Smaller crucial habitat is located near Rock Springs Bench and Circle Cliffs. As of 2018, the UDWR estimates Utah's population of desert bighorn sheep at 2,900. The decision area is home to two bighorn sheep populations: Kaiparowits East/West and Kaiparowits Escalante. In 2018, the estimate for these combined populations was 954 sheep (UDWR 2018). Bighorn sheep prefer very open vegetation types such as low shrub, grassland, and other treeless types typically associated with steep talus and rubble slopes. Bighorn sheep diets consist of a variety of shrubs, forbs, and grasses. Lambing occurs on steep talus slopes, typically within 1 to 2 miles of reliable water sources.

Bighorn sheep are extremely vulnerable to a variety of viral and bacterial diseases carried by livestock, principally domestic sheep. In some reported cases, bighorn sheep exposure to these diseases has resulted in the decimation of entire populations. These diseases are transmitted in numerous ways, including nose-to-nose contact and wet soils associated with areas of concentrated use such as stock watering ponds. Management of bighorn sheep is guided by the following BLM documents: Utah BLM Statewide Desert Bighorn Sheep Management Plan Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat (Western Association of Fish and Wildlife Agencies Wild Sheep Working Group 2012), Utah Bighorn Sheep Statewide Management Plan (UDWR 2018), and corresponding UDWR herd management plans.

Pronghorn

The Utah statewide population estimate for pronghorn is 15,695, and efforts are ongoing to reintroduce the species into historical habitats to augment existing populations (UDWR 2017). Archaeological data suggest that pronghorns were present in portions of south-central Utah but were extirpated by the early 1900s. In the 1970s, the UDWR began a reintroduction program within GSENM, which was ultimately unsuccessful. Poaching led to the herd being extirpated for the second time by the 1980s. With the establishment of GSENM, the Kaiparowits population has been a beneficiary of augmentation efforts, receiving just under 400 individuals between 1999 and 2005. However, the population was estimated at 60 individuals in 2017 and currently 40 individuals are estimated across all of GSENM.²⁰ The pronghorn population in GSENM is a small portion of the entire Paunsaugunt population, which was stable and estimated at 800 individuals in 2017 (UDWR 2017).

²⁰Cameron McQuivey, BLM GSENM wildlife biologist, personal communication on July 27, 2022, regarding pronghorn populations.

There are 82,900 acres of year-long crucial habitat for pronghorn within the decision area (BLM GIS 2022; **Figure 3-32, Appendix A**). Pronghorns use shrub-steppe habitat, characterized by large expanses of open, low, rolling, or flat terrain (UDWR 2009). Lactating females rely on succulent forbs in the spring and early summer and need high-quality browse above snow level in winter (UDWR 2017). Pronghorn fawning occurs throughout the range of this species. Pronghorn diets consist of a variety of forbs, shrubs, and grasses. Forbs are of particular importance during spring and summer, while shrubs are more important during the winter.

Mule Deer

There are 1,239,100 acres of mule deer habitat, including winter, year-long, and summer habitat, found throughout the decision area (BLM GIS 2022; **Figure 3-33, Appendix A; Table 3-53**). Mule deer use a variety of habitats, usually areas in the early stages of plant succession, where they browse on forbs and grasses (UDWR 2019a). In winter in the decision area, they use piñon-juniper, sagebrush, and mixed vegetation cover types; in the summer, they use sagebrush, bitterbrush (*Purshia tridentata*), and rabbitbrush (*Chrysothamnuss* spp.) (Messmer and Klimack 1999). They rely especially on shrubs for forage during critical winter months.

Table 3-53. Acres of Mule Deer Habitat within GSENM

Habitat	Acres
Summer crucial	126,500
Summer substantial	17,400
Winter crucial	852,600
Winter substantial	224,000
Year-long substantial	18,400
Total	1,239,100

Source: BLM GIS 2022

A major challenge to mule deer management in Utah is that many of the UDWR-designated crucial deer ranges are in late successional plant community stages. These areas are dominated by mature stands of piñon-juniper or other conifer trees and old, even-aged stands of shrubs, such as sagebrush. This makes them less favorable to mule deer (UDWR 2019a).

Mule deer are migratory, moving seasonally between summer and winter ranges. Mule deer usually summer at high elevations and winter at low elevations. There are 21,100 acres of migration corridors that have been identified for mule deer in GSENM. Studies have shown that some mule deer on the Paunsaugunt Plateau migrate south into Arizona for winter (Messmer and Klimack 1999). An estimated 6,500 mule deer migrate from higher elevations of the Paunsaugunt Plateau and travel up to 30 miles to winter habitats at lower elevations in areas such as Buckskin Mountain, Nephi Pasture, and Fivemile Mountain.

Mule deer have a high degree of fidelity to specific winter ranges where high population densities concentrate on relatively small areas. Big game species, including mule deer, are vulnerable to stress caused by human activity, and can displayed varied response such as altered behavior and reduced vigor and productivity (Anderson 1995).

Elk

There are 165,600 acres of elk habitat, including winter, year-long, and summer habitat, within the decision area at mid to high elevations (BLM GIS 2022; **Figure 3-34, Appendix A; Table 3-54**). Elk are habitat generalists and have a varied diet consisting of grasses, forbs, and shrubs. This flexible diet allows them to live in a variety of habitat types, including all of Utah's mountains and some of the low deserts. Many elk in the decision area are migratory, moving seasonally between summer and winter ranges. Elk generally spend summers at high elevations in aspen and conifer forests and winters at mid- to low-elevation habitats that contain mountain shrub and sagebrush communities (UDWR 2020). There are also established year-round residents in the Circle Cliffs and Skutumpah Terrace. Human activity in elk winter range adds additional stress to the natural stress of winter survival.

Table 3-54. Acres of Elk Habitat within GSENM

Habitat	Acres
Summer substantial	10,800
Winter crucial	13,300
Winter substantial	79,900
Year-long substantial	61,500
Total	165,600

Source: BLM GIS 2022

Notes: Totals may not exactly equal the sum of the line items above due to rounding.

The Paunsaugunt and Plateau-Boulder elk herds are both managed primarily through hunting. Herds are intentionally kept low and therefore elk are uncommon throughout GSENM. The 2014 population estimate for the Paunsaugunt herd was 175 individuals, and the Plateau-Boulder herd was estimated at 1,700 (UDWR 2020), although the vast majority of both units encompass large areas outside of GSENM. It is estimated that less than 100 elk from both units utilize habitats in GSENM on a regular basis.

Special Status Species

On the lands it manages in the decision area, the BLM is directly responsible for managing habitat for special status species and indirectly responsible for the health of special status species that these habitats support. These species are animals and plants that require specific management attention because of population or habitat concerns. Special status species are federally listed as threatened, endangered, proposed, or candidate species or BLM-listed sensitive species. The BLM-listed sensitive species include all documented or suspected federal candidate species, those listed by UDWR as endangered or threatened, and any other species that may be designated by the director.

It is in the BLM's interest to implement conservation actions for sensitive, non-listed species before listing is warranted. It is also in the public's interest for the BLM to implement conservation actions that improve the status of such species so that their BLM sensitive recognition is no longer warranted. In so doing, the BLM will have greater flexibility in managing public lands to accomplish native species conservation objectives and other legal mandates. BLM Manual 6840 provides policy and guidance for the conservation of BLM special status species and the ecosystems on which they depend that occur on BLM-managed lands (BLM 2008a).

The BLM has two objectives for special status species: 1) to conserve or allow to recover ESA-listed species and their habitats so that ESA protections are no longer needed; and 2) to initiate conservation

measures that reduce or eliminate threats to BLM-listed sensitive species to minimize the likelihood of, and need for, listing under the ESA (BLM 2008b).

Federally Listed Species

Endangered or threatened species are those that the Secretary of the Interior has officially listed under the ESA and for which a final rule has been published in the *Federal Register*. Proposed species are those that the Secretary has officially proposed for listing as endangered or threatened and for which a proposed rule has been published in the *Federal Register*. Candidate species are those that the USFWS has designated as candidates for listing as endangered or threatened species and are included on a list published in the *Federal Register*. Candidate status indicates that existing information warrants listing the species, but other species have higher priority for listing.

A list of federally threatened, endangered, and candidate species that have the potential to occur in the decision area was obtained from the USFWS's Information for Planning and Consultation website on March 16, 2023. Ten animal species have the potential to occur in the decision area; however, after consultation with the GSENM biologist, this list was refined to include four species (**Table 3-55**; USFWS 2022). The decision area overlaps designated critical habitat for the Mexican spotted owl and the southwestern willow flycatcher (*Empidonax traillii extimus*).

Table 3-55. Federally Listed Species that Have the Potential to Occur in GSENM

Species	Scientific Name	Federal Status	BLM Status
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Endangered	Sensitive Species
California condor	<i>Gymnogyps californianus</i>	Experimental Population	Sensitive Species
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	Sensitive Species
Monarch butterfly	<i>Danaus plexippus</i>	Candidate	Sensitive Species

Source: USFWS 2023

Due to lack of occurrence records, it was determined that the Utah prairie dog (*Cynomys parvidens*) does not have the potential to occur in the decision area. Suitable habitat for western yellow-billed cuckoo (*Coccyzus americanus*) is not present in the decision area. Although this species has been observed in dense riverside tamarisk thickets at several locations on the Colorado and San Juan Rivers, the primary element of their critical habitat, vast riparian woodlands with mixed willow-cottonwood vegetation in contiguous patches greater than 325 feet in width and 200 acres or more in extent (NPS 2014), is not present in the decision area. Additionally, there are no known occurrence records for the western yellow-billed cuckoo in the decision area.²¹ Although listed on the USFWS' Information for Planning and Consultation list, the humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*) are not currently known or expected to occur in GSENM.

BLM-listed Sensitive Species

It is the BLM's policy to ensure that actions authorized, funded, or carried out do not contribute to the need for a species to become listed (BLM 2008b). The sensitive species designation is normally used for species that occur on BLM-managed surface land for which it has the capability to significantly affect the species' conservation status through management.

²¹Cameron McQuivey, BLM GSENM wildlife biologist, personal communication on July 6, 2022, regarding federally listed species in the decision area.

The UDWR maintains a list of sensitive species within the State Wildlife Action Plan (Utah Wildlife Action Plan Joint Team 2015). Many of the sensitive species listed by the BLM overlap with the UDWR list; however, because the lists are maintained separately, they differ slightly. These lists are subject to periodic updates, and new lists will be incorporated into the land use plan through plan maintenance or amendments. The most recent BLM instructional memorandum listing Utah State BLM state sensitive species is UT-2019-005 (BLM 2019), updated March 4, 2019.

BLM biologists reviewed and refined the Utah State BLM Sensitive Species List (BLM 2019) to species occurring or with potential to occur in the decision area (**Table 3-56**).

Table 3-56. BLM Sensitive Species Documented in or Potentially Occurring in the Decision Area

Species	Scientific Name	BLM Status	State Status	Occurrence in GSENM
Birds				
Northern goshawk	<i>Accipiter gentilis</i>	Conservation Agreement Species	Conservation Agreement Species	One confirmed territory in Mud Springs Canyon and one additional territory in Rock Creek/Mudholes; occasionally observed in winter in piñon-juniper habitat
Golden eagle	<i>Aquila chrysaetos</i>	Sensitive Species	Species of Concern	Permanent resident in the decision area; commonly observed
Burrowing owl	<i>Athene cunicularia</i>	Sensitive Species	Species of Concern	Documented in the Hole-in-the-Rock area and near Church Wells
Short-eared owl	<i>Asio flammeus</i>	Sensitive Species	Species of Concern	Uncommon permanent resident in the decision area
Ferruginous hawk	<i>Buteo regalis</i>	Sensitive Species	Species of Concern	Commonly observed during winter raptor surveys; two unoccupied historic nests on West Clark Bench
Greater sage-grouse	<i>Centrocercus urophasianus</i>	Sensitive Species	Species of Concern	Uncommon winter resident; 5,800 acres of priority habitat management areas (winter habitat) in the Skutumpah/Glendale Bench area
Bald eagle	<i>Haliaeetus leucocephalus</i>	Sensitive Species	Species of Concern	Winter resident in the decision area; commonly seen during winter raptor surveys
Lewis's woodpecker	<i>Melanerpes lewis</i>	Sensitive Species	Species of Concern	Uncommonly observed in piñon-juniper and oak habitats in the decision area
Mammals				
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Sensitive Species	Species of Concern	Known to occur in the decision area
Spotted bat	<i>Euderma maculatum</i>	Sensitive Species	Species of Concern	Known to occur in the decision area
Allen's big-eared bat	<i>Idionycteris phyllotis</i>	Sensitive Species	Species of Concern	Known to occur in the decision area
Western red bat	<i>Lasiurus blossevillii</i>	Sensitive Species	Species of Concern	Potential habitat in the decision area

3. Affected Environment and Environmental Consequences (Fish and Wildlife)

Species	Scientific Name	BLM Status	State Status	Occurrence in GSENM
Fringed myotis	<i>Myotis thysanodes</i>	Sensitive Species	Species of Concern	Known to occur in the decision area
Big free-tailed bat	<i>Nyctinomops macrotis</i>	Sensitive Species	Species of Concern	Confirmed in the decision area through mist net capture (BLM 2008b)
Insects				
Western bumble bee	<i>Bombus occidentalis</i>	Sensitive Species	Species of Concern	Known to occur in the decision area
Monarch butterfly	<i>Danaus plexippus</i>	Sensitive Species	Species of Concern	Known to occur in the decision area, although breeding habitat is likely limited
Amphibians				
Arizona toad	<i>Bufo microscaphus</i>	Sensitive Species	Species of Concern	Not found in 5 years of surveys (Heyborne and Gardner 2021)
Reptiles				
Common chuckwalla	<i>Sauromalus ater</i>	Sensitive Species	Species of Concern	Not found in 5 years of surveys (Heyborne and Gardner 2021)
Desert night lizard	<i>Xantusia vigilis</i>	Sensitive Species	Species of Concern	Not found in 5 years of surveys (Heyborne and Gardner 2021)
Fishes				
Bluehead sucker	<i>Catostomus discobolus</i>	Conservation Agreement Species	Conservation Agreement Species	Present in the Escalante River drainage
Flannelmouth sucker	<i>Catostomus latipinnis</i>	Conservation Agreement Species	Conservation Agreement Species	Present in the Escalante River drainage
Roundtail chub	<i>Gila robusta</i>	Conservation Agreement Species	Conservation Agreement Species	Present in the Escalante River drainage
Colorado River cutthroat trout	<i>Oncorhynchus clarkia pleuriticus</i>	Conservation Agreement Species	Conservation Agreement Species	Present in the Escalante River drainage

Source: BLM 2019

Greater Sage-grouse

The greater sage-grouse (*Centrocercus urophasianus*) is a keystone species and is representative of the quality of sagebrush habitat it shares with other wildlife, including many big game species, mammals, and other avian species. In 2010, the USFWS determined that the greater sage-grouse warranted ESA protection because of population declines caused by loss and fragmentation of sagebrush habitat and a lack of regulatory mechanisms to control habitat loss (75 *Federal Register* 13910, March 23, 2010). However, higher-priority listing actions precluded the USFWS from taking action to list the greater sage-grouse.

Greater sage-grouse is considered a sagebrush ecosystem obligate species; it relies on sagebrush at a landscape level and on a microhabitat scale. It requires large, intact, interconnected expanses of sagebrush shrubland to exist (Connelly et al. 2004; Wisdom et al. 2011). As a landscape-scale species, it moves between habitats seasonally and requires contiguous winter, breeding, nesting, and summer habitats to sustain a population (Connelly et al. 2011).

There are 5,800 acres of greater sage-grouse priority habitat management area in the Skutumpah/Glendale Bench of the decision area (BLM GIS 2022; **Figure 3-35**, Special Status Species, in **Appendix A**). Priority habitat management areas are areas identified with the highest conservation value for maintaining sustainable greater sage-grouse populations. Priority habitat management areas in the decision area comprise the far southern portion of the Panguitch sage-grouse population area, which it is identified as wintering habitat (BLM and Forest Service 2015). Opportunity habitat is an area that contains elements of sage-grouse habitat that could become occupied under land management practices promoting healthy sagebrush steppe. Opportunity habitat is not mapped but rather identified on the ground using criteria listed in the Utah Conservation Plan for Greater Sage Grouse (State of Utah 2019). Habitat in the Panguitch population area is experiencing localized threats of habitat loss from piñon-juniper expansion.

Trends

Fish

Some of the decision area's aquatic habitats, notably the Paria River, have gradually declined over the last century due to a combination of human influences such as water diversions, irrigation projects, improper livestock grazing, roads, farming and ranching practices that dewater the system, mining, and recreational use. Such activities have led to a loss of wetland and riparian habitats, reduced water quantity and quality, increased water temperatures, increased loss of instream habitat, and fragmented stream reaches, all of which have led to declining native fish populations. At present, only the speckled dace is known to occur in this system. Fish species in the Escalante River drainage are trending better than those in the Paria River according to UDWR monitoring data (UDWR 2019b). Although the Escalante River contains many nonnative species, the current diversity of native and nonnative species has existed in the river system for decades.

Properly functioning riparian conditions in good ecological form are necessary to maintain quality fish habitat. Riparian PFC assessments completed in the decision area between 2000 and 2014 are displayed on **Figure 3-25 (Appendix A)** and show that 66 percent of lentic sites (standing water) were in PFC and an additional 17 percent were functioning at risk, with an upward trend toward PFC. Fourteen percent of lentic sites were functioning at risk, with a downward trend or no apparent trend, and 3 percent were nonfunctional. Of lotic sites (moving water), 74 percent were in PFC, 4 percent were functioning at risk with an upward or static trend, 23 percent were functioning at risk with no apparent or a downward trend, and none were nonfunctional (BLM GIS 2022). These data suggest that most riparian and wetland sites assessed were in functioning condition or were moving toward functioning condition.

Analysis of AIM data identified eight departed watersheds within GSENM. Supporting this analysis, three watersheds, Upper Johnson Wash, Upper Paria River, and Hackberry Canyon-Cottonwood Creek, are also included on the UDWQ 303(d) list of impaired waters (see **Section 3.4.1**, Water Resources, *Affected Environment*). These analyses indicate that habitat and/or water quality within these watersheds have a high departure from ecological site conditions that could impact aquatic species' populations. These impacts could include reduced reproductive success, reduced habitat suitability, and changed prey abundance. Refer to **Appendix B** for a more detailed review of this analysis.

Wildlife and Habitat

Most fish and wildlife species are not monitored thoroughly enough to determine changes in distribution and abundance. However, big game populations and trends are estimated in each species' statewide 5-year management plan. Specific trends in the decision area are unknown.

Analysis of AIM data identified eight departed watersheds within GSENM. This analysis reviewed multiple indicators that could influence habitat suitability for many wildlife species. See **Section 3.3, Vegetation, Affected Environment,** and **Appendix B** for a more detailed review of this analysis. Departure from ecological site conditions could impact multiple wildlife species. For example, a downward trend in perennial grasses and forbs could lead to a decrease in habitat suitability and forage for species that rely on these vegetation communities. There has also been a significant increase in tree cover throughout GSENM, which could also lead to a decrease in habitat suitability for species that rely on grassland vegetation communities. Additionally, soil stability was not achieving desired conditions throughout GSENM. This could impact vegetation communities which, in turn, could contribute to loss of habitat for some species.

Bighorn Sheep

As of 2018, the UDWR estimated Utah's population of desert bighorn sheep at 2,900. Utah currently has 13 individually managed populations of desert bighorn sheep, many of which are the result of transplant efforts. Five of these populations are showing increasing trends, seven are stable, and one is declining because of culling efforts due to disease outbreak. Trend counts for the two populations in the decision area were 88 individuals in the Kaiparowits, Escalante Unit (2017; between 2012 and 2017, this population has fluctuated between a low of 71 individuals in 2012 and a high of 91 individuals in 2014), and 355 individuals in the Kaiparowits, East/West Unit (2015; 339 individuals were counted in 2013, which is the only other year data is available between 2012 and 2017) (UDWR 2018).

Pronghorn

Between 1999 and 2005, 373 pronghorns were released in the East Clark Bench area of GSENM and Utah State lands. The pronghorns initially dispersed over a large area forming three distinct herds: Flat Top, Telegraph Flat/West Cove, and East Clark Bench. The UDWR set a population objective of 600 pronghorns, but that goal has never been met. In recent years, two herds, the Flat Top and Telegraph Flat/West Cove herds, are thought to be extirpated. The lack of water sources throughout the region is a limiting factor. However, the single greatest limiting factor appears to be an extreme lack of precipitation during the fawning/rearing period, which limits the availability of green vegetation necessary to support offspring. April, May, and June are consistently the driest months (Bryce et al. 2012), and they directly correspond with fawning/rearing season. The inability of the herd to consistently recruit new members through reproduction is affecting its ability to establish a sustainable population.

Mule Deer

The 2019 post-season statewide population estimate for mule deer in Utah was 372,500, which is 82 percent of the long-term management objective of 453,100 individuals. The population had good growth during the mid- to late-1990s, but then declined during the severe drought years from 2000 to 2003 when fawn production decreased. The harsh winters in northern Utah in 2007–2008 and in southern Utah in 2009–2010 negatively impacted adult and fawn survival, resulting in population declines. Weather conditions from 2011 to 2015 were favorable for mule deer, resulting in an increase of nearly 100,000 deer. Overall, the deer population in Utah has grown at an average rate of 1.6 percent over the past 20 years (UDWR 2019a). Habitat conditions in the Kaiparowits and Paunsaugut population units in the decision area have been declining; desert conditions, along with limited water distribution, may exacerbate habitat limitations (UDWR 2015a).

Elk

Elk are well established throughout Utah, with the current statewide population estimated at 81,000. From 1975–1990, the elk population in Utah grew from an estimated 18,000 to 58,000 individuals, largely due to population levels below carrying capacity and the abundance of available habitat. From 1990 to 2005, population growth slowed considerably as a result of expanded harvest management designed to reduce population growth rates (UDWR 2020). Albeit in low numbers, elk currently inhabit two main areas of GSENM, the Skutumpah Terrace/Glendale Bench area and the Circle Cliffs.

Special Status Species

Few data exist to determine trends for special status fish species in GSENM. However, monitoring conducted by the UDWR in the region indicates most populations of flannelmouth sucker, roundtail chub, and bluehead sucker are stable (UDWR 2019b). Roundtail chub most recently were identified (2015) in the Escalante River (UDWR 2015b). Factors affecting populations that are declining include drought, nonnative species competition and predation, and habitat degradation (UDWR 2019b).

Special status fish species populations generally have been declining throughout Utah. The downward trend is largely due to habitat degradation and loss of habitat complexity caused by erosion, riparian vegetation removal, and channelization (UDWR 2019b). Additionally, increased drought, stream dewatering, and fish barriers pose substantial threats to sensitive aquatic species recovery and contribute to declining numbers. Nonnative predation on and resource competition with special status fish species also threaten native aquatic populations throughout Utah.

The Colorado Plateau Rapid Ecoregional Assessment modeled near-term (2025) aquatic habitat intactness in the Colorado Plateau ecoregion, which includes the decision area. Modeled habitat intactness for aquatic species, including razorback sucker, flannelmouth sucker, and Colorado River cutthroat trout, declined from low to very low (Bryce et al. 2012), which may be related to declining trends for these species.

The southwestern willow flycatcher relies on dense riparian systems at critical stages of their life cycles (USFWS 2002; UDWR 2011). Critical habitat for southwestern willow flycatcher in the decision area exists along the Paria River, and nonbreeding individuals have been observed in riparian areas in both the Paria and Escalante River corridors. There are 1,100 acres of critical habitat that overlap the decision area (BLM GIS 2022; **Figure 3-35, Appendix A**).

Several breeding pairs of Mexican spotted owl have been observed over multiple years in the decision area (Willey and Willey 2010; Hockenbary 2011). Critical habitat exists in the decision area, and nesting territories are also protected by eight federally designated protected activity centers, a component of the species' recovery plan (USFWS 2012). There are 440,900 acres of critical habitat and 5,915 acres of protected activity centers that overlap the decision area (BLM GIS 2022; **Figure 3-35, Appendix A**). Population trends across the species' range remain unclear because there are few data on populations or occupancy rates (USFWS 2012); similarly, conclusions cannot be drawn from the limited data available in the decision area.

Regional habitat intactness can be used to gauge trends for terrestrial special status wildlife species. The Colorado Plateau Rapid Ecoregional Assessment modeled near-term (2025) terrestrial habitat intactness. Results indicate relatively small changes in the negative direction (that is, lower habitat intactness). According to the Colorado Plateau Rapid Ecoregional Assessment near-term (2025) terrestrial habitat

intactness model, greater sage-grouse showed the most notable declines in habitat quality of all bird species as a result of development projected in the ecoregion (Bryce et al. 2012). Because development density is much lower in the decision area, habitat declines for greater sage-grouse would be less notable than modeled in the Colorado Plateau Rapid Ecoregional Assessment. Currently, all other bird species, including Mexican spotted owl, golden eagle, burrowing owl (*Athene cunicularia*), and peregrine falcon, have a wider range of more intact habitat classes (Bryce et al. 2012). These species' higher-quality habitat intactness declined but was matched by increases in lower-quality habitat intactness in the near term (2025) (Bryce et al. 2012).

Based on data from the 2022 greater sage-grouse lek counts, statewide lek counts were up 36.8 percent from 2021 counts, with 2,913 male sage-grouse counted on 205 leks. The increase reverses a downward trend from the last population peak in 2015 through 2021 (UDWR 2022). There are no known greater sage-grouse leks within GSENM. Historically, there were three leks within 0.5 miles of GSENM in the Skutumpah Terrace area of the KFO, but those leks became inactive in the 1980s.

Forecasts

Fish

Temperatures for many streams across southern Utah, including those in GSENM, are predicted to increase by 2080 (NorWest 2014). Increases in stream temperatures will have impacts on habitat suitability for a variety of species, especially those requiring cold-water habitat such as trout.

The BLM has little influence over the water uses occurring in the upper reaches of the Paria River. Irrigation and water rights allowing diversion and dewatering are outside of the BLM's control. Flows in streams and river systems in the decision area are flashy in nature and experience extreme ranges in flow volume due to monsoonal precipitation events. Restoration or improvement of fisheries, where possible, is mainly tied to sustainable water flows, instream habitat (pools and riffles), and riparian vegetation. The UDWR has proposed restoration of native fish species (Colorado River cutthroat trout) in tributaries of the Escalante River, such as Calf Creek. The BLM could coordinate with landowners (federal, state, and private) to ensure that watershed conditions are adequate to support fish populations, implement habitat-improvement projects, and to ensure protection of fisheries habitats. Whenever possible, the BLM could work with the state of Utah to secure instream flows.

The importance of ensuring that habitat connectivity is maintained, improved, and/or conserved is emphasized in the 2023 BLM instruction memorandum (2023-005) that directs BLM state offices to consult with state fish and wildlife agencies and tribes to assess habitat connectivity to manage, as best as possible, for intact, connected habitat. The instruction memorandum states that the BLM recognizes that state and tribes generally have authority and expertise over fish and wildlife management and that their collaboration of management regarding connectivity, permeability, and resilience should be prioritized.

Wildlife and Habitat

Habitat connectivity and movement corridors for both terrestrial and aquatic species will be an important component of sustainable wildlife populations. Although the designation of GSENM, as well as federal, state, and local regulations, provides some degree of protection, habitat fragmentation still occurs. Road and infrastructure development, increased visitor use, social trails, stream diversions, and dam installations can all impede or restrict species' movements that could be critical for reproduction, accessing forage

areas, and establishing home ranges. As discussed above, BLM instruction memorandum 2023-005 also applies to habitat connectivity for wildlife.

Climate change and its associated impacts are significant threats to fish and wildlife. Warming temperatures, drought, wildfire, and other extreme weather effects will increase in frequency. This will likely contribute to impacts on fish and wildlife and their habitats as climate change continues. The Colorado Plateau Rapid Ecoregional Assessment suggests that the ecoregion is expected to undergo general warming over the entire region, with as much as a 3.6°F (2°C) increase by 2060 in some locations, particularly in the southern portion of the ecoregion (Bryce et al. 2012). Average summer temperatures will increase, but even greater increases are simulated for the winter (Bryce et al. 2012).

Vegetation communities expected to have the greatest exposure (that is, higher probability for change) to climate change are shrublands (especially big sagebrush and blackbrush-Mormon tea communities), riparian vegetation, and piñon-juniper woodland (Bryce et al. 2012). These vegetation communities provide crucial habitat for a number of special status wildlife species in GSENM, including foraging habitat for golden eagles and peregrine falcons, seasonal range for bighorn sheep, year-round habitat for sensitive reptiles like chuckwalla and desert night lizard, and critical habitat for the federally endangered southwestern willow flycatcher.

Insects and disease will play a collateral role in the impacts of climate change by altering the dominance and distribution of various vegetation species (Bryce et al. 2012); this will, in turn, alter the distribution and availability of habitat for fish and wildlife.

Another major threat further exacerbated by climate change is the shift in vegetation community structure and composition. Piñon-juniper woodlands have increased dramatically in the decision area over the past century and now occupy many other vegetation communities where they were once not present or at least not dominant. Shrub-steppe communities, especially sagebrush communities, have suffered greatly due to this vegetation shift. Sagebrush-obligate wildlife species such as songbirds, sage-grouse, and big game have declined in western states. Although this expansion has slowed in recent years, its impacts remain. Opportunities to restore degraded habitats are numerous within the decision area.

3.9.2 Environmental Consequences

This section describes direct, indirect, and cumulative effects on fish, wildlife, and special status species from implementation of management direction under each alternative. Impacts on wildlife, fish, and special status species would primarily be associated with vegetation management, grazing, and recreational activities.

Refer to **Section F.14**, Fish and Wildlife, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management affect wildlife, fisheries, and special status species resources?

Impacts Common to All Alternatives

Impacts on Wildlife

Impacts common to all alternatives include disturbance to wildlife species and possible abandonment or avoidance. These impacts would largely be associated with discretionary uses such as vegetation management, grazing, and recreational activities. Research has shown that wildlife responses to disturbances vary and can have detrimental effects such as altered behavior, reduced vigor, and reduced reproduction success, for example, from nest abandonment (Anderson 1995). If disturbances persist, many species may permanently avoid those areas. However, some species may adapt to disturbances over time and recolonize disturbed habitats. Disturbances are more likely to occur in easily accessible areas where human presence is high and in areas open to intensive motorized use. Permanent infrastructure such as roads, trails, parking lots, and campgrounds can disrupt movement patterns and migration routes for many wildlife species. Impacts also include the potential for injury or mortality to wildlife, specifically from vehicle collisions. Funding from other agencies or organizations that provides money directly to livestock grazing permittees to complete habitat-improvement projects has been used to a minor extent to improve conditions on allotments within GSENM. These projects have been primarily focused on decadent brush removal to improve forage for grazing livestock, some wildlife species may also benefit. Because this funding is tied to allotment permittees, and under Alternatives B, C, and D the number of allotments available for livestock grazing would be reduced, available funding would also decrease across Alternatives B, C, and D. However, in the past these types of projects occur infrequently and these programs have not been often utilized; therefore, analysis of how these programs would be impacted from the range of alternatives is difficult to quantify.

Under Alternatives B, C, and D, the continued existence of structural and nonstructural range improvements would have impacts on many wildlife species. For example, water developments would provide water for many species such as birds and mammals, and vegetation projects would remove nonnative species, which would improve habitat conditions. However, adverse impacts would also continue, such as the fragmentation of habitat from fencing that could impede the movement of some wildlife species, like bighorn sheep and pronghorn. Localized ground disturbance, even on a small scale, may destroy habitat for ground-nesting endemic bees and other invertebrate pollinator species.

Under Alternatives B, C, and D, water availability would be facilitated to offset the effects of drought or to disperse native terrestrial species to avoid disease outbreaks. This management direction would benefit wildlife, like bighorn sheep, and habitats, compared with Alternative A, which has no similar management direction.

Short-term noise (such as from vehicles and humans) has been documented to cause physiological effects for a variety of wildlife species, including increased heart rate, altered metabolism, and changes in hormone balance (Radle 2007). Impacts would be both short and long term, depending on the type and source of noise. These impacts are difficult to quantify, as different species and even individuals of the same species can have varying responses to acoustic stimuli (Radle 2007; Barber et al. 2011). Sources of noise include a variety of recreational activities, such as OHV use, hiking, and target shooting, as well as other activities such as vegetation management and general management.

In general, impacts on special status species would be similar to those described for all wildlife species. Because there are limited data on known habitat locations for special status species in GSENM, impacts are discussed in generalized terms and are often included with non-special status species. However,

because special status species often require specific habitat conditions that are generally not ubiquitous throughout GSENM and population numbers are typically low, impacts on these species may be disproportionately adverse. For example, all special status fish species are known only from the Escalante River drainage (**Table 3-56**), and critical habitat for the southwestern willow flycatcher is in the Paria River. Discretionary actions that include surface-disturbing activities could directly impact these species by altering water quality and quantity. Because these species are not found in other river drainages, altered habitat suitability in the Escalante River or Paria River drainages could impact entire populations of these species. However, under all alternatives, specific management direction, such as avoidance of discretionary actions within 330 feet of riparian and wetland areas and project level BMPs, would protect wildlife including special status species and critical habitat.

Impacts on Wildlife Habitat

Discretionary uses across all alternatives serve as primary indicators of impacts on wildlife because these activities have the potential to impact wildlife habitat. Impacts on wildlife habitat would largely be associated with degradation, loss, and fragmentation. Fragmentation and degradation of wildlife habitats can reduce suitability and productivity, increase predation, and restrict seasonal or migratory routes that allow species to move from one area to another. Fragmentation and permanent loss of habitat can occur through the development of roads, trails, and infrastructure. Discretionary uses such as vegetation management, grazing, and recreation could impact wildlife by degrading vegetation communities through soil disturbance, trampling, plant removal, increased fugitive dust, and the introduction and spread of noxious and invasive weeds. Additionally, these uses can result in the loss of vegetation used for shelter and foraging, which supports a variety of species, and loss of ground nests for endemic bees. Trails, roads, and ROW development that could occur under each alternative would impact habitat by fragmenting the landscape and influencing habitat suitability for species that require large, contiguous habitats. Specific impacts on vegetation are discussed in **Section 3.3, Vegetation**.

Under all alternatives, surface-disturbing activities would impact habitat for many species. Impacts on soils could alter habitat suitability for species such as small mammals and insects that burrow, hibernate, or use underground areas to complete stage of their life cycles. For example, the *Diadasia* family of bees build their nests in hard soils in the GSENM region. Impacts from surface-disturbing activities therefore could impact habitat suitability for some species of these bees. Additionally, surface-disturbing activities can also alter vegetation composition that could impact birds, mammals, reptiles, and insects that rely on specific vegetative conditions for forage, nesting, or breeding.

Disturbances in riparian areas can cause erosion and sedimentation, bank destabilization, water quality degradation, and water quantity fluctuations, all of which can contribute to a reduction of aquatic ecosystem health. Impacts on water resources would affect a variety of wildlife species including fully aquatic species such as fish and terrestrial species that are reliant on water throughout their life cycles such as birds, mammals, insects, amphibians, and reptiles. Impacts from a variety of uses including recreational activities, vegetation management, and grazing can affect water resources. Specific impacts on water resources are discussed in **Section 3.4, Water Resources**.

In general, impacts on special status species habitat would be similar to those described for all wildlife species. However, as described in the *Affected Environment*, many special status species are directly linked to specific habitat types that may be limited within GSENM. For example, greater sage-grouse are sagebrush obligate species, requiring intact sagebrush communities for breeding, shelter, and forage.

Within GSENM there are only 2,800 acres of Inter-Mountain Basins Montane Sagebrush Steppe (**Table 3-11**). Additionally, there are only 5,800 acres of greater sage-grouse priority habitat management area in GSENM. The priority habitat management area is further confined to the Skutumpah/Glendale Bench area of GSENM (BLM GIS 2022; **Figure 3-35, Appendix A**). Therefore, discretionary actions in sagebrush communities that impact small amounts of acreage may disproportionately impact sagebrush obligate species, such as greater sage-grouse.

Additionally, densely vegetated riparian systems required by the southwestern willow flycatcher are uncommon in GSENM, and only 1,100 acres of critical habitat overlap the decision area, in the Paria River drainage. Therefore, even relatively small impacts on this habitat could result in a large percentage of suitable habitat becoming lost or degraded, or a loss of function of designated critical habitat. Because many species utilize riparian systems, impacts on these habitats would impact a variety of wildlife. Because special status species often require habitat components that are more restrictive than general wildlife species, impacts on these habitats can have greater impacts on special status species.

The introduction and spread of nonnative plant species can disrupt the symbiotic relationships between pollinators and their host plants. Many pollinators, including the monarch butterfly (*Danaus plexippus*) and many bee species, are reliant on specific plant hosts for food or reproduction. These relationships make them less adaptable to a reduction in the host plants' population or changes in its distribution. In addition, many plants species have evolved to be dependent on specific pollinators and may not survive without them.

Many goals, objectives, management directions, and allocations for wildlife and fish would remain the same or similar under all alternatives. These directives provide protection for wildlife and their habitats while allowing for other discretionary uses. Management direction for all alternatives include limiting discretionary uses to protect and recover special status species (BLM Utah listed sensitive; federally listed threatened, endangered, proposed, or candidate plant, animal, and fish species) habitats and populations. Seasonal closures would protect special status raptor species like golden eagle, peregrine falcon, and Swainson's hawk, and special status riparian birds like yellow-billed cuckoo and southwestern willow flycatcher. Group size limits would be established in Mexican spotted owl protected activity centers and management would implement the relevant decisions from the Greater Sage-Grouse Management Plan (BLM and Forest Service 2015) applicable to habitat. Surface-disturbing activities would be avoided or prohibited within 0.5 miles of occupied California condor roosts. Additionally, protection of other resources often has an incidental, beneficial impact of protecting wildlife, fish, and special status species habitat. For example, vegetation management including prescribed burns, habitat maintenance and restoration, and removal of noxious and invasive species have the greatest potential to improve existing conditions, even if their primary function is not related to wildlife. These treatments could reduce soil loss, improve wildlife habitat, restore ecological function, and increase available forage. Additionally, the protection of cultural or paleontological sites could benefit wildlife and habitats if these areas overlap.

Other management directions that would benefit wildlife include protecting important migration and movement corridors throughout GSENM for both aquatic and terrestrial species. Under all alternatives, a 21,112-acre seasonal avoidance area would be established along the U.S. Highway 89 corridor. This corridor would restrict uses during the winter to allow the Paunsaugunt mule deer herd to migrate south into Arizona for winter (Messmer and Klimack 1999). Other designations, such as WSAs, would also limit discretionary actions (for example, recreation and OHV use) and protect wildlife habitat from surface

disturbances that could alter soil, vegetation, and water resources that degrade wildlife and fish habitat and displace wildlife. Management of WSAs would be the same under all alternatives. Recreational management areas including SRMAs, ERMAs, and RMZs would occur under all alternatives, although acreage would vary. In RMAs, rules and guidelines would limit or control activities through specialized management tools such as designated campsites, permits, area closures, and limitations on user numbers and duration of use. Generally, these limitations would benefit wildlife and their habitats by restricting the number of visitors and activities that could cause habitat degradation. Specific prescriptions for RMAs are included in **Appendix E**, Recreation Management Areas.

Additional resource conservation measures as described in **Appendix C**, Resource Conservation Measures, would protect wildlife, fish, and special status species habitat. Specific BMPs are included for the southwestern willow flycatcher, yellow-billed cuckoo, Mexican spotted owl, California condor, and bald eagle. Other BMPs are included for general wildlife and fish species. These BMPs would be implemented on a project-by-project basis.

Alternative A

Alternative A generally allows for maximum discretionary uses, including livestock grazing, and emphasizes management flexibility while still providing for resource protection as required by applicable laws and regulations, including the protection of GSENM objects. Under Alternative A, it is likely that current trends pertaining to wildlife and habitat would continue as described under *Affected Environment*.

General management activities that would impact wildlife under Alternative A include retaining the No Mans Mesa RNA (ACEC), which would prohibit livestock grazing, OHV use, and campfires within the area. These management directions would reduce impacts on wildlife and habitats by removing competition between livestock and wildlife and limiting disturbances from OHV use. However, No Mans Mesa RNA (ACEC) is only 2,800 acres and, therefore, provides protection to a small fraction of the overall acreage of GSENM. Additionally, under Alternative A, lands with wilderness characteristics would not be managed for those characteristics. Therefore, wildlife and habitats would be vulnerable to impacts in these areas.

Impacts on Wildlife

Under Alternative A, all methods and tools would be available for vegetation management. These treatments would be prioritized to remove woodland products to improve rangeland health and wildlife habitat. The current focus has included spot treatments for noxious weeds, preemergent herbicide application prior to seeding (targeting cheatgrass), harrowing and seeding, prescribed fire, and follow-up seeding post-treatment. **Table 3-16** summarizes past vegetation management; these trends in vegetation management, which focus on seeding, would continue under Alternative A. Vegetation management could have short-term impacts on wildlife by causing species to avoid areas during and immediately after treatment activities. For example, human presence associated with the removal of noxious and invasive species would likely alter wildlife activity in treatment vicinity. Additionally, most wildlife would disperse from areas during prescribed burns and potentially avoid these areas for some time afterward until vegetation reestablishes enough to provide forage and shelter. Aquatic species could also be impacted by the removal of vegetation, which can increase erosion and increase sedimentation in aquatic environments.

Under Alternative A, nearly all allotments within GSENM would continue to be available for livestock grazing. Approximately 2,116,200 acres of GSENM would be available for livestock grazing and 107,995 AUMS would be allocated. Livestock grazing can directly impact wildlife species through competition and

avoidance of areas where livestock are present. Species have differing responses to the presence of livestock, and species that are directly dependent on vegetation—such as herbivores and pollinators—have the greatest response to livestock grazing (Filazzola et al. 2020). Although grazing would be available on the majority of GSENM, not all allotments would have livestock and not all portions of allotments are suitable for livestock grazing. Many areas that have bare ground, rock, or steep slopes would generally be avoided by livestock, although these areas also do not provide habitat characteristics that provide for wildlife diversity. Typically, livestock congregate in areas that provide forage, shade and water, all of which are important to wildlife species. Direct competition for these resources would occur mainly between livestock and big game species such as pronghorn and mule deer. Of the 1,228,500 acres of mule deer habitat, 1,201,400 acres would overlap available allotments under Alternative A. Specifically, only 26,000 acres of winter mule deer habitat would be unavailable for livestock grazing (BLM GIS 2022), meaning competition for forage during the winter, when resources are less abundant, would occur within the majority of GSENM.

Available allotments under Alternative A overlap small portions of both greater sage-grouse priority habitat management areas and southwestern willow flycatcher habitat. Over 436,300 acres overlap Mexican spotted owl critical habitat, and 5,300 acres overlap Mexican spotted owl protected activity centers (BLM GIS 2022). Cattle grazing has been shown to reduce rodent species richness and abundance and the abundance of woodrats (*Neotoma* spp.) specifically; woodrats are the primary prey species for Mexican spotted owl within riparian corridors (Willey 2007). However, because not all areas of allotments are used by cattle, only portions of allotments may overlap Mexican spotted owl foraging habitat.

Under Alternative A, grazing of domestic sheep and goats would be considered within GSENM. Consideration would also be given to using domestic sheep and goats as pack animals. Disease transmission from domestic livestock to wild, bighorn sheep can be devastating to populations since they typically do not have immunity to diseases associated with domestic livestock (USGS 2017). Although effective physical separation of domestic sheep and goats and wild sheep would be required, allowing sheep and goat grazing under this alternative could increase the possibility of disease transmission between domestic sheep and goats and bighorn sheep.

Recreation in GSENM has increased substantially in recent years and will likely continue to increase. Many recreational activities, including hiking, hunting, OHV use, and camping, have the potential for adverse short- and long-term impacts on fish and wildlife, such as disturbance and displacement. Under Alternative A, five SRMAs, two ERMAs, and 10 RMZs would continue being managed as such. These RMAs would cover the entirety of GSENM and establish specific management direction that would limit certain recreational uses that could benefit wildlife. These restrictions, such as group size limits and camping and campfire limitations, would reduce impacts on many wildlife species including special status species.

OHV use designations would continue to impact many wildlife species. Under Alternative A, OHV use would continue to be limited to designated routes on 1,862,700 acres. Within these areas, OHV use would impact wildlife through disturbance and avoidance. Additionally, vehicle/wildlife collisions could cause injury or mortality to a variety of species, but particularly to small mammals, birds, and reptiles. Mule deer are common throughout GSENM and are, therefore, frequent subjects of vehicle collisions. A report from 2014 cited that, on average, there are 132 mule deer–vehicle collisions along U.S. Highway 89 between Kanab, Utah, and the Arizona state line (Utah Department of Transportation 2014). Approximately 1,239,100 acres of OHV limited areas would overlap mule deer habitat (BLM GIS 2022),

meaning a large portion of GSENM would have potential for vehicle/mule deer collisions. With expected increases in visitation, these potential vehicle/wildlife collisions would also increase.

There are 440,900 acres where OHVs would be limited to designated routes that would overlap Mexican spotted owl critical habitat and 5,300 acres that would overlap protected activity centers. Smaller overlaps of OHV-limited areas occur for greater sage-grouse habitat management areas and southwestern willow flycatcher critical habitat (5,800 acres and 1,100 acres, respectively; BLM GIS 2022). Impacts from noise and vehicles could cause disturbances to these species, especially if routes within these areas are used frequently. Because most avian species, including these special status species, are more susceptible to noise and human occupancy during the breeding season, if routes within these overlapping areas are used during the nesting season, impacts such as nest abandonment or reduced offspring survival could occur. Noise from OHV use during the winter could also disturb greater sage-grouse using the 5,800 acres of habitat management areas in GSENM. Disturbance can affect winter habitat selection and cause habitat avoidance (State of Utah 2019).

Under Alternative A, the majority of GSENM is open to target shooting, which is only prohibited within a 0.25-mile buffer of residences, campgrounds, and developed recreation facilities. Recreational target shooting could cause wildlife to avoid areas during use due to noise and human presence. If target shooting areas are used consistently, there is potential that some wildlife species may permanently avoid these areas. Additionally, the use of lead ammunition can result in unintentional exposure and be fatal for some wildlife species (Quy 2010).

Impacts on Wildlife Habitat

Under Alternative A, all methods and tools would continue to be available for vegetation management. These treatments would continue to be prioritized to remove woodland products to improve rangeland heath and wildlife habitat. The current focus has included spot treatments for noxious weeds, preemergent herbicide application prior to seeding (targeting cheatgrass), harrowing and seeding, prescribed fire, and follow-up seeding post-treatment. **Table 3-16** summarizes past vegetation management; these trends in vegetation management with a focus on seeding would continue under Alternative A. In the short term, these treatments may alter habitat characteristics such that they are no longer suitable for some species. For example, use of prescribed fire to reduce nonnative annual grasses or woody vegetation would reduce cover that provides shelter and alters insect populations that provide forage for small mammals, birds, and reptiles. However, over the long term, these treatments would improve wildlife habitat by restoring natural conditions and increasing forage. Specifically, big game species such as elk, mule deer, and pronghorn would benefit from the removal of woody species that would allow perennial grasses to establish and provide forage. Other species that rely on grassland habitats, such as migratory birds, pollinators, and small mammals, would also benefit from these treatments.

Under Alternative A, no preference would be given to the use of native seeds during restoration. Species that rely on native plants for shelter or forage could be impacted if vegetation management remove native species and these species are not used during restoration. As described under *Impacts Common to All Alternatives*, the removal or decrease of native plant species could impact pollinator species disproportionately if the host plants' population is reduced or lost.

Alternative A would continue to provide the most acreage and AUMs for livestock grazing across all alternatives. Impacts on wildlife habitat can occur through livestock grazing and surface disturbance from

range improvements. These impacts can damage and alter sensitive riparian areas if fencing is not properly installed and maintained. Impacts on soil by improper distribution can cause soil compaction, which can alter the ability of vegetative species to grow and result in bare ground. Additionally, as discussed in **Section 3.5.I**, disturbed habitats have high levels of plant invasions related to the destruction of soil crusts and local displacement of native species by invasive species (Stohlgren et al. 2005).

Under Alternative A, 531,400 acres of bighorn sheep habitat and 1,204,400 acres of mule deer habitat overlap acres available for livestock grazing. Additionally, 5,800 acres overlap greater sage-grouse habitat priority areas, 436,300 acres overlap Mexican spotted owl critical habitat, and 1,100 acres overlap southwestern willow flycatcher critical habitat. As described above, grazing in these areas could lead to habitat becoming unsuitable for these species as well as others. Because greater sage-grouse require specific sagebrush habitat characteristics throughout their life cycles, even small disturbances to these habitats could cause suitability to be impacted. Because southwestern willow flycatcher habitat is closely associated with riparian systems and livestock require access to water, the areas of critical habitat that overlap grazing areas could become unsuitable if grazing alters the riparian ecosystems.

Recreational use is likely to continue to increase within GSENM, which increases the potential for impacts on wildlife habitat. As described in *Impacts Common to All Alternatives*, these impacts would largely be associated with habitat degradation and fragmentation through OHV use. Alternative A would retain the Little Desert RMZ as an OHV open area, with the majority of the remaining acreage continuing to be managed as OHV limited. Only No Mans Mesa RNA (ACEC) would be managed as closed to OHV use, which overlaps with 2,700 acres of mule deer habitat but no acres of bighorn sheep habitat (BLM GIS 2022). All routes in OHV limited and open areas could impact habitat connectivity if they are used frequently. In OHV limited areas, vehicular travel would be allowed only on designated routes, and impacts on soil, water, and vegetation resources that could affect habitat suitability would be limited to the designated routes. Species that require large home ranges, such as mule deer, bighorn sheep, black bear, and some avian species, could have those ranges or habitats fragmented by these routes.

Alternative A would designate RMAs including ERMA, SRMA, and RMZs throughout the entirety of GSENM. Within RMAs, rules and guidelines limit or control recreational activities through specialized management prescriptions such as designated campsites, permits, area closures, limitations on number of users, and duration of use. (**Appendix E**, Recreation Management Areas). Because each RMA would have different management prescriptions and wildlife habitats do not align with RMA boundaries, beneficial and adverse impacts on wildlife habitat from the designation of RMAs are difficult to categorize. In some instances, RMA prescriptions may be used to concentrate recreational users into specific areas, thereby concentrating impacts to these areas and reducing impacts in others. However, wildlife habitats in areas where recreational use is concentrated may be disproportionately affected, and habitat suitability for some species could decline or habitats become unsuitable. Impacts on wildlife habitat within RMAs from recreational use would occur; however, the rules and guidelines associated with RMAs are designed to reduce impacts recreational use would have on all GSENM objects, including wildlife and their associated habitats.

Alternative B

Alternative B emphasizes flexibility in planning level direction to maximize the potential for an array of discretionary actions that are compatible with the protection of GSENM objects. Due to the allowance of discretionary actions under Alternative B it is likely that there would be similar impacts on wildlife and

habitats to Alternative A. However, due to management direction under Alternative B, impacts would be expected to be slightly reduced, compared with Alternative A.

Alternative B would designate two ACECs and four RNAs (ACECs) (**Table 2-1**). These areas, similar to WSAs and lands with wilderness characteristics, would restrict uses associated with recreation and other discretionary actions that would likely benefit wildlife by reducing disturbances that would cause avoidance and minimizing uses that would degrade or fragment habitat. Management of lands with wilderness characteristics under Alternative B would be similar to the management under Alternative A. Under Alternative B, there would be an increase of only 72,000 acres of lands with wilderness characteristics that would be managed to protect wilderness characteristics compared with no acres under Alternative A. While this increase in acres of lands with wilderness characteristics managed to protect those characteristics would likely protect wildlife habitats from degradation and fragmentation, restrictions in these areas may also limit the ability of management to use all available types of vegetation management; therefore, they may be forced to use more passive and less productive tools and methods.

Impacts on Wildlife

Vegetation management actions under Alternative B would be similar to those described under Alternative A. Both alternatives would focus on improving vegetation communities at the watershed level. Alternative B would prioritize the use of native vegetation, while still allowing the use of nonnative species in certain instances. Limiting the use of nonnative species would reduce the potential of nonnative species outcompeting and reducing habitat for native species. Under both alternatives, landscape-scale restoration projects have the potential to disrupt and disturb wildlife over a broader area and, therefore, impact more individuals and populations. In the short term, species that are less mobile may succumb to injury or mortality during these activities. In the long term, species with small home ranges may have their habitat degraded or completely lost.

Under Alternative B, in addition to the allotments that are unavailable under Alternative A, allotments that do not have a current grazing permit would become unavailable for livestock grazing. This would result in 78,900 additional acres becoming unavailable for grazing and reduce AUMs by 2,961. Compared with Alternative A, the reduction in AUMs and acres available for livestock grazing under Alternative B would reduce competition between livestock and wildlife as well as limit impacts on species associated with habitats used by livestock. Compared with Alternative A, 76,100 additional acres of mule deer habitat would be unavailable for livestock grazing (BLM GIS 2022). Compared with Alternative A, this would reduce direct competition mule deer and other ungulates such as pronghorn. Other species such as small mammals, pollinators, and many migratory birds that rely on grasslands for forage and shelter would also benefit from the reduction in allotment availability and AUMs.

Allotments available under Alternative B that overlap special status species habitat would not vary substantially from Alternative A. Therefore, impacts on these species would be similar for this alternative compared with Alternative A.

Under Alternative B, grazing and use of domestic sheep and goats as pack animals would be allowed within GSENM. Although effective physical separation would be required between domestic sheep and goats and bighorn sheep, the lack of a prohibition on sheep and goat grazing and as pack animals under this alternative could increase the possibility of disease transmission between domestic sheep and goats and bighorn sheep.

Under Alternative B, 1,770,100 acres would be designated as ERMAs with only a small increase in SRMA acreage compared with Alternative A (from 67,600 to 95,300 acres). Therefore, impacts on wildlife from the designation of RMAs would be similar to Alternative A. Because these acres are similar and management of RMAs are similar for these alternatives, it is expected that impacts on these species would be similar to those under Alternative A.

Alternative B would close the only OHV open area that would be open under Alternative A, a portion of the Little Desert RMZ. This closure would likely have little impact on wildlife because the area is only 2,500 acres, and only 100 acres of that is open to cross-country OHV travel. However, Alternative B would also close 950,200 additional acres where OHVs would be limited to designated routes under Alternative A. Closing previously designated limited areas would reduce vehicular travel on designated routes and, therefore, limit disturbances to wildlife, reduce habitat fragmentation, and allow unrestricted wildlife movement.

Under Alternative B, an additional 60,000 acres of OHV closed routes would overlap mule deer habitat (62,400 acres). Additionally, 283,100 acres managed as closed to OHV use would overlap Mexican spotted owl critical habitat and 5,100 acres would overlap protected activity centers. A smaller overlap of OHV closed acreage would occur for southwestern willow flycatcher critical habitat (400 acres; BLM GIS 2022). Because no OHV closed areas overlap these special status species' habitats under Alternative A, the increases in closed areas that prohibit vehicular travel under Alternative B would reduce vehicle collision risk with wildlife, reduce avoidance and disturbance caused by vehicles, and allow species with large home ranges or long-distance migration routes to safely move between habitats.

Recreational target shooting would be prohibited on an additional 964,300 acres compared with Alternative A. This increase would come from the addition of prohibiting shooting acreage in RNAs (ACECs) and WSAs/ISAs. This reduction of acres available for target shooting would reduce noise and human presence associated with recreational target shooting and, therefore, reduce disturbance to wildlife and avoidance of areas. Additionally, the increase in acreage where target shooting would be prohibited would reduce the unintentional wildlife exposure to lead ammunition.

Impacts on Wildlife Habitat

Vegetation management under Alternative B would be similar to those described under Alternative A, although more focus would be given to large landscape-scale restoration projects. Compared with Alternative A, these restoration projects have the potential to alter habitat suitability across larger portions of the landscape. Therefore, in the short term, these projects could reduce or eliminate vegetation or habitat characteristics (for example, downed logs, snags, and woody debris) that provide forage, shelter, and breeding areas. However, these treatments would have a larger long-term beneficial impact by improving habitat over a larger area and potentially improving habitat connectivity.

Compared with Alternative A, Alternative B would prioritize the use of native vegetation for all vegetation management efforts. However, certain stipulations, such as site-specific conditions and accordance with BLM policy, would allow the use of nonnative vegetation as long as the seeding leads towards a native vegetation community. This distinction is important because it allows management to conduct vegetation management that may be high priority and immediately necessary even if native seed is unavailable.

Under Alternative B, in addition to the allotments that would be unavailable under Alternative A, allotments that do not have a current grazing permit would become unavailable for livestock grazing. This would add 78,900 acres as unavailable for grazing and reduce AUMs by 2,961. Compared with Alternative A, Alternative B's reduction in AUMs and acres available for livestock grazing would reduce the potential for surface disturbance through livestock grazing and result in range improvements. However, because this reduction in acres and AUMs is relatively small, there likely would not be a substantial benefit to wildlife habitat compared with Alternative A. Additionally, overlap of mule deer, bighorn sheep, and special status species habitats would be similar to Alternative A, and impacts would be expected to be similar compared with Alternative A.

Under Alternative B, 1,770,100 acres would be designated as ERMA with only a small increase in SRMA acreage compared with Alternative A (from 67,600 to 95,300 acres). Because RMAs cover similar areas of GSENM in Alternatives A and B, overlap of RMAs and mule deer habitat, bighorn sheep habitat, and special status species habitat would be similar. Therefore, impacts on wildlife habitat from the designation of RMAs would be similar to Alternative A. Because each RMA would have different management prescriptions, and wildlife habitats do not align with RMA boundaries, beneficial and adverse impacts on wildlife habitat from the designation of RMAs is difficult to categorize. Impacts on wildlife habitat within RMAs from recreational use would occur; however, the rules and guidelines associated with RMAs are designed to reduce impacts recreational use would have on all GSENM objects, including wildlife and associated habitat.

Alternative B would close the only area that would be open to OHVs under Alternative A, a portion of the Little Desert RMZ. This closure would likely have little impact on wildlife habitat because the area is only 2,500 acres, and only 100 acres are open to cross-country OHV travel. Alternative B would also close 953,100 acres to OHV use and 912,500 acres where OHVs would be limited to designated routes. Closing previously designated OHV limited areas would likely benefit wildlife habitat by reducing impacts on soil and vegetation from vehicle travel and restoring habitat connectivity by reducing miles of routes that can fragment habitat.

Alternative C

Alternative C would emphasize the protection of intact and resilient landscapes using an area management approach to allow for discretionary uses in appropriate settings. Four management areas would be established: front country, passage, outback, and primitive. These areas would be used to identify allowable uses that meet the area's goals and objectives while also protecting GSENM objects. Under Alternative C, more protection in the outback and primitive areas would likely reduce impacts on wildlife and habitat compared with Alternative A. The front country and passage areas would allow for more discretionary uses and, therefore, likely impact wildlife and habitat similar to those under Alternative A.

Alternative C would designate four RNAs (ACECs), compared with one RNA (ACEC) under Alternative A (**Table 2-1** in **Chapter 2**). Alternative C would also include protective measures for 190,100 acres of lands with wilderness characteristics. These areas, similar to WSAs, would restrict uses such as recreation that would likely benefit wildlife by reducing disturbances that would cause avoidance and minimizing discretionary actions that would degrade or fragment habitat. However, these areas may restrict some types of vegetation management that could improve wildlife habitat.

Impacts on Wildlife

Vegetation management under Alternative C would emphasize active restoration in the front and passage areas, while focusing on passive restoration in the outback and primitive areas. Impacts from restoration activities on wildlife, such as avoidance and disturbance, would be similar in the front and passage areas as Alternative A. Because passive restoration would be prioritized in the outback and primitive areas, these areas would have reduced impacts from Alternative A. Because these areas make up the majority of GSENM, overall impacts on wildlife from vegetation management activities would be reduced under Alternative C, compared with Alternative A.

Under Alternative C, in addition to the allotments that are unavailable under Alternative A, allotments that do not have a current grazing permit would become unavailable for livestock grazing and allotments withing Glen Canyon would also be unavailable. This would add 189,200 acres as unavailable for grazing and reduce AUMs by 10,538. Compared with Alternative A, this reduction in AUMs and acres available for livestock grazing under Alternative C would reduce competition between livestock and wildlife as well as limit impacts on species associated with habitats used by livestock. Specifically, big game species that directly compete with livestock for forage would benefit from the reduction in livestock grazing under this alternative. Compared with Alternative A, a 76,100 additional acres of mule deer habitat would be unavailable for livestock grazing (BLM GIS 2022). Ungulates, such as pronghorn, and other species, such as small mammals, pollinators, and many migratory birds that rely on grasslands for forage and shelter, would also benefit from the reduction in allotment availability and AUMs.

Allotments available under Alternative C that overlap special status species habitat would not vary dramatically from Alternative A. Therefore, impacts on these species would be similar for Alternative C.

Under Alternative C, grazing of domestic sheep and goats would be prohibited within GSENM. Additionally, domestic sheep and goats would only be allowed as pack animals outside of occupied desert bighorn sheep habitat. This prohibition and restriction would effectively eliminate the potential for disease transmission between domestic sheep and goats and bighorn sheep.

Under Alternative C, 486,300 acres would be designated as ERMA and 417,400 as SRMA. This decrease in RMAs compared with Alternative A could lead to more impacts on wildlife. With fewer restrictions on recreation, there is potential that larger group sizes, fewer restrictions on camping and campfires, and the development of facilities could lead to an increase of disturbance and avoidance of certain areas compared with Alternative A.

Similar restrictions would be applied for the area management associated with Alternative C. Generally, management for the front and passage areas would be less limiting while the outback and primitive areas would be more restrictive. For example, competitive events would be prohibited in the outback and primitive areas, the front country and passage areas, group size limits and stock animal limits would decrease from the front country area through the primitive area would be placed on camping and campfires in the outback and primitive areas. Similar to the RMA designations, these area prescriptions would concentrate recreational uses in specific areas while limiting them in others. Therefore, impacts on wildlife-associated recreational uses such as hiking and camping would be reduced in the outback and primitive areas and increased in the front country and passage areas.

Alternative C would close the only OHV open area that would be open under Alternative A, a portion of the Little Desert RMZ. This closure would likely have little impact on wildlife because the area is only 2,500 acres, and only 100 acres are open to cross-country OHV travel. Alternative C would also close 1,207,000 additional acres that would be OHV limited under Alternative A. Closing previously designated limited areas would reduce vehicular travel on designated routes and, therefore, limit disturbances to wildlife. For example, Alternative C would close 728,800 acres that overlap mule deer habitat and 483,700 acres that overlap bighorn sheep habitat (BLM GIS 2022). This reduction in vehicular travel would reduce the risk of vehicle collisions with these species, as well as others, and allow species with large home ranges or long-distance migration routes to safely move between habitats.

Approximately 315,000 acres of OHV closed areas would overlap Mexican spotted owl critical habitat and 5,200 acres would overlap protected activity centers. A smaller overlap of OHV closed areas would occur for southwestern willow flycatcher critical habitat, 400 acres (BLM GIS 2022). Because no OHV closed areas overlap these special status species habitats under Alternative A, the areas closed under Alternative C would prohibit vehicular travel and reduce vehicle-wildlife collision risk, reduce avoidance and disturbances from vehicles, and allow species with large home ranges or long-distance migration routes to safely move between habitats.

Recreational target shooting would be prohibited on 1,206,300 additional acres compared with Alternative A, as a result of prohibiting shooting in the front country and primitive areas. This reduction of acres available for target shooting would reduce noise and human presence and, therefore, reduce disturbance and avoidance to wildlife. Additionally, this increase in acreage where target shooting would be prohibited would reduce the unintentional exposure wildlife to lead ammunition.

Impacts on Wildlife Habitat

The effects on wildlife habitat from vegetation management under Alternative C would be similar to those described for Alternative A. Although all vegetation management methods and tools would be available, including active restoration, more focus would be given to large landscape-scale restoration projects that would protect and restore a mosaic of noninvasive perennial and annual vegetation communities across the landscape with diversity of species, canopy, density, and different stages of composition. Compared with Alternative A, large landscape-scale restoration projects have the potential for a larger long-term beneficial impact by improving habitat over a larger area and potentially improving habitat connectivity.

Under Alternative C, in addition to the allotments that are unavailable under Alternative B, allotments that cross the GSENM and Glen Canyon boundary would be unavailable to livestock grazing on the Glen Canyon portion of the allotments. This would add 110,300 acres as unavailable for grazing and reduce AUMs by 12,589. Structural range improvement would only be authorized if a land health assessment has been completed, which would limit the number of new range improvements compared with Alternative A, which provides no restrictions on structural range improvements. Compared with Alternative A, this reduction in AUMs and acres available for livestock grazing would reduce the potential for surface disturbance through livestock grazing practices and range improvements. However, because this reduction in acres and AUMs is relatively small, there would likely not be a substantial benefit to wildlife habitat compared with Alternative A. Additionally, overlap of mule deer, bighorn sheep, and special status species habitats with allotments available for grazing would be similar to Alternative A; therefore, impacts would be expected to be similar.

Approximately 527,000 acres of bighorn sheep habitat and 1,125,300 acres of mule deer habitat overlap acres available for livestock grazing under Alternative C. Because these overlaps of habitat and acres available for grazing are similar to Alternative A, it is expected that grazing under Alternatives A and C would impact wildlife habitat similarly. Overlap of special status species habitat and acres available for livestock grazing would also be similar compared with Alternative A; therefore, impacts would be expected to be similar.

Under Alternative C, 486,300 acres would be designated as ERMA and 417,400 as SRMA. This decrease would also correlate to a decrease in the overlap of RMAs with wildlife habitat including big game, migratory birds, and special status species and lead to more impacts on habitat. With less restrictions on recreation, there is the potential that larger group sizes, fewer restrictions on camping and campfires, and the development of facilities could lead to an increase degradation of wildlife habitat compared with Alternative A. Because each RMA would have different management prescriptions and wildlife habitats do not align with RMA boundaries, beneficial and adverse impacts on wildlife habitat from the designation of RMAs is difficult to categorize as recreational use would occur within RMAs; however, the rules and guidelines associated with RMAs are designed to reduce impacts recreational use would have on all GSENM objects, including wildlife and associated habitat.

Similar restrictions would be applied to the area management associated with Alternative C. Generally, management for the front country and passage areas would be less limiting while the outback and primitive areas would be more restrictive. The restrictions in the outback and primitive areas would reduce the impacts recreational activities would have on wildlife habitat.

Alternative C would close the only OHV open area that would be open under Alternative A, a portion of the Little Desert RMZ. This closure would likely have little impact on wildlife habitat because the area is only 2,500 acres, and only 100 acres are open to cross-country OHV travel. Alternative C would also close 1,209,900 acres to OHV use and 655,700 acres would be OHV limited use. Within the OHV closed areas, 7 miles of routes would be closed (BLM GIS 2022). Closing previously designated limited areas would likely benefit wildlife habitat by reducing impacts on soil and vegetation from vehicle travel and restoring habitat connectivity by reducing miles of routes that can fragment habitat.

Alternative D

Alternative D would maximize natural processes by limiting discretionary uses. Land use allocations would curtail discretionary uses, including recreation, livestock grazing, ROWs, and activities under SRPs. This alternative would also constrain management actions to emphasize natural conditions such as passive vegetation management. Alternative D would restrict more discretionary uses and protect more wildlife habitat through land use allocations and, therefore, reduce impacts on wildlife and habitat compared with Alternative A.

Alternative D would designate one RNA (ACEC), No Mans Mesa, the same as Alternative A. However, all lands with wilderness characteristics (559,600 acres) would be managed to protect wilderness characteristics, which is a more restrictive designation than under Alternative A, where lands with wilderness characteristics would not be protected. This management direction under Alternative D would provide more protection to both wildlife and their habitats by restricting some uses, such as recreation, that would be allowed in lands with wilderness characteristics. However, these designations would also restrict some management actions such as vegetation management that could benefit wildlife habitat.

Impacts on Wildlife

Vegetation management under Alternative D would prioritize natural processes and techniques compared with active restoration under Alternative A. The prioritization of natural processes would likely reduce the number of restoration projects that use active management and instead rely on passive management. Limiting active management, which would likely include groups of workers and equipment, would reduce direct impacts those projects would have on wildlife. However, as described below, the reduction in these projects may also adversely impact wildlife habitat.

Under Alternative D, in addition to the allotments that are unavailable under Alternative C, allotments within departed watersheds would be unavailable. This would add 966,200 acres as unavailable for grazing and reduce AUMs by 62,747, compared with Alternative A. Compared with Alternative A, this reduction in AUMs and acres available for livestock grazing would reduce competition between livestock and wildlife as well as limit impacts on species associated with habitats used by livestock. Specifically, big game species that directly compete with livestock for forage would benefit from the reduction in livestock grazing under this alternative. Approximately 716,100 acres of mule deer habitat would no longer be available for grazing under Alternative D (BLM GIS 2022). Compared with Alternative A, this would reduce direct competition for mule deer and other ungulates such as pronghorn (BLM GIS 2022). The reduction of grazing availability within winter mule deer habitat from 1,040,200 acres under Alternative A to 372,300 (BLM GIS 2022) under Alternative D would greatly reduce competition between livestock and mule deer during the winter when resources are less abundant. Other species such as small mammals, pollinators, and many migratory birds that rely on grasslands for forage and shelter would also benefit from the reduction in allotment availability and AUMs.

Under Alternative D, less habitat for special status species would overlap with areas available for livestock grazing. The reduction in the overlap of Mexican spotted owl habitat and acres available for grazing from 436,300 acres under Alternative A to 66,500 under Alternative D would reduce impacts associated with Mexican spotted owl prey abundance and distribution (as previously described under Alternative A). Overlap of greater sage-grouse priority habitat management areas and southwestern willow flycatcher critical habitat would also decrease, but to a lesser degree (BLM GIS 2022).

Under Alternative D, grazing of domestic sheep and goats would be prohibited within GSENM. Additionally, domestic sheep and goats would only be allowed as pack animals outside of occupied desert bighorn sheep habitat. This prohibition and restriction would effectively eliminate the potential for disease transmission between domestic sheep and goats and bighorn sheep.

Under Alternative D, 251,200 acres would be designated as ERMA and 161,000 as SRMAs. This decrease in RMAs compared with Alternative A could lead to more impacts on wildlife. With fewer restrictions on recreation, there is potential that larger group sizes, fewer restrictions on camping and campfires, and the development of facilities could lead to an increase in disturbance and avoidance of certain areas compared with Alternative A.

Alternative D would close the only OHV open area that would be open under Alternative A, a portion of the Little Desert RMZ. This closure would likely have little impact on wildlife because the area is only 2,500 acres, and only 100 acres are open to cross-country OHV travel. Alternative D would also close 1,635,900 additional acres that would be OHV limited under Alternative A. Closing previously designated limited areas would reduce vehicular travel on designated routes and, therefore, limit disturbances to

wildlife. This reduction in vehicular travel would also reduce vehicle-wildlife collision risk and allow species with large home ranges or long-distance migration routes to safely move between habitats. For example, Alternative D would close 1,049,000 acres that overlap mule deer habitat and 527,100 acres that overlap bighorn sheep habitat (BLM GIS 2022). This reduction in vehicular travel would reduce the risk of vehicle collisions with these species as well as others and allow species with large home ranges or long-distance migration routes to safely move between habitats.

Approximately 409,500 acres of OHV closed would overlap Mexican spotted owl critical habitat and 5,300 acres would overlap protected activity centers. Smaller overlaps of OHV closed areas would occur for greater sage-grouse habitat management areas and southwestern willow flycatcher critical habitat (1,900 and 1,100 acres, respectively; BLM GIS 2022). Because no OHV closed areas overlap these special status species habitats under Alternative A, these areas closed under Alternative D would prohibit vehicular travel and reduce vehicle-wildlife collision risk, reduce avoidance and disturbances from vehicles, and allow species with large home ranges or long-distance migration routes to safely move between habitats.

Recreational target shooting would be prohibited throughout GSENM. This reduction of acres available for target shooting would reduce noise and human presence and, therefore, reduce disturbance to and avoidance by wildlife. Additionally, the prohibition of target shooting would eliminate the unintentional exposure of wildlife to lead ammunition.

Impacts on Wildlife Habitat

The prioritization of natural processes may limit the amount of restoration projects, methods, and techniques that would be available under Alternative D. The reliance on passive management could increase the spread of noxious and invasive species if certain tools and techniques were not authorized for use. Studies have shown that in some circumstances, such as after wildfire, using passive restoration methods can lead to high levels of woody fuels, which in turn can lead to fires of unnaturally high intensity that can cause more severe damage to vegetation communities compared with natural fire regimes (Forest Service 2022). Additionally, the reliance on natural processes may lead to restoration projects requiring more time to achieve the same results active management can accomplish.

Compared with Alternative A, Alternative D would prioritize the use of native vegetation for all vegetation management efforts. However, under emergency situations, the use of nonnative vegetation would be approved as long as the seeding leads toward a native vegetation community. This distinction is important because it allows management to conduct vegetation management that may be of high priority and immediately necessary, even if native seed is unavailable.

Under Alternative D, in addition to the allotments that are unavailable under Alternative C, allotments within watersheds that have a high departure from ecological site conditions where there is no substantial evidence that conditions are improving would be unavailable. This would add 966,200 acres as unavailable for grazing and reduce AUMs by 62,747, compared with Alternative A. Compared with Alternative A, this reduction in AUMs and acres available for livestock would reduce the potential for surface disturbance through livestock grazing practices and range improvements.

Approximately 306,700 acres of bighorn sheep habitat and 512,400 acres of mule deer habitat overlap acres available for livestock grazing under Alternative D. Additionally, 4,800 acres overlap greater sage-grouse habitat priority areas, 66,500 acres overlap Mexican spotted owl habitat, and 100 acres overlap

southwestern willow flycatcher critical habitat (BLM GIS 2022). This decrease in acres available for grazing would protect habitats used by these species from degradation associated with livestock grazing. Because greater sage-grouse require specific sagebrush habitat characteristics throughout their life cycles, protecting these characteristics is crucial to maintaining habitat suitability. Additionally, because southwestern willow flycatcher habitat is closely associated with riparian systems and livestock require access to water, the southwestern willow flycatcher critical habitats that overlap grazing acreage could become unsuitable if grazing alters the riparian ecosystems.

Under Alternative D, 251,200 acres would be designated as ERMA and 161,000 as SRMA. This decrease would also correlate with a decrease in the overlap of RMAs with wildlife habitats, including habitats for big game, migratory birds, and special status species, and lead to more impacts on habitat. With fewer restrictions on recreation, there is potential that larger group sizes, fewer restrictions on camping and campfires, and the development of facilities could lead to increased degradation of wildlife habitat compared with Alternative A. Because each RMA would have different management prescriptions and wildlife habitats do not align with RMA boundaries, beneficial and adverse impacts on wildlife habitat from the designation of RMAs is difficult to categorize. In some instances, RMA prescriptions may be used to concentrate recreational users into specific areas, thereby concentrating impacts and reducing impacts in other areas. However, wildlife habitats in areas where recreational use is concentrated may be disproportionately affected, and habitat suitability for some species could decline or habitats become unsuitable. Recreational use impacts on wildlife habitat within RMAs from would occur; however, the rules and guidelines associated with RMAs are designed to reduce the impacts recreational use would have on all GSENM objects, including wildlife and associated habitat.

Alternative D would close the only OHV open area that would be open under Alternative A, a portion of the Little Desert RMZ. This closure would likely have little impact on wildlife habitat because the area is only 2,500 acres, and only 100 acres are open to cross-country OHV travel. Alternative D would also close 1,638,800 acres to OHV use and 226,800 acres would be OHV limited. Within the OHV closed areas, 7 miles of routes would be closed (BLM GIS 2022). Closing previously designated limited areas would likely benefit wildlife habitat by reducing impacts on soil and vegetation from vehicle travel and restoring habitat connectivity by reducing miles of routes that can fragment habitat.

Cumulative Impacts

The cumulative impacts analysis area for fish, wildlife, and special status species varies by species. Analysis areas for big game species are composed of game management units that intersect GSENM. For aquatic species, the cumulative impacts analysis area extends outside GSENM, following boundaries of the watersheds that completely or partially overlap it. For migratory birds and terrestrial wildlife species other than big game, the cumulative impacts analysis area is GSENM. Cumulative impacts on fish, wildlife, and special status species are linked to those described for vegetation, as vegetation communities provide habitat for wildlife.

Past, present, and reasonably foreseeable future actions would have varying beneficial and adverse impacts on fish, wildlife, and special status species. Past discretionary uses have caused (1) habitat degradation, loss, and fragmentation; (2) increased human presence (including increases in vehicle and aviation use and resulting noise); and (3) the spread of invasive species. However, management efforts, including vegetation management and habitat restoration activities, have had beneficial impacts by improving habitat connectivity, plant productivity, vegetation diversity, and ecosystem health.

Ongoing management for fish, wildlife, and special status species by the BLM, UDWR, and NPS include the dedication of resources for maintaining and restoring habitats and the consideration of these resources during review and approval of discretionary actions. These actions are critical to maintaining healthy and sustainable populations given the increasing levels of visitation and recreational use that are anticipated.

Reasonably foreseeable future projects that would affect fish, wildlife, and special status species in the cumulative impacts analysis areas include:

- Sage-grouse habitat restoration that would include vegetation management to thin and reduce pinyon pine and Utah juniper to allow the establishment of grasses and forbs. Restoration would also include actions to reduce erosion and sedimentation.
- Development of a noxious and invasive species vegetation management plan for the KFO. Because the KFO shares boundaries with GSENM, this plan would impact GSENM by reducing the spread of noxious weeds from outside its borders.

Additionally, other projects, such as ROW projects (for example, the Lake Powell Pipeline), road development and maintenance, and renewable energy projects, would also have the potential to impact fish, wildlife, and special status species.

As described in **Section 3.1.2**, Climate Change (Including Greenhouse Gases), changes in climate would continue throughout the region including GSENM. Changes in vegetation composition due to increased temperatures, departure from normal fire regimes, and changes in precipitation patterns will likely impact habitat suitability for many species. These changes have already been documented in portions of GSENM. As described in **Section 3.3**, Vegetation, *Affected Environment*, vegetation communities that have the highest potential for impacts due to climate change include shrubland, riparian, and pinyon-juniper woodland vegetation communities (Bryce et al. 2012). Wildlife that use these habitats will be impacted by a reduction in or loss of habitat suitability.

In general, the reduced restrictions on discretionary actions under Alternatives A and B, when combined with other land uses and past, present, and reasonably foreseeable future actions, would result in adverse cumulative impacts on fish, wildlife, and special status species. Management actions and allocations associated with Alternatives C and D would contribute to adverse cumulative effects on fish, wildlife, and special status species to a lesser degree than Alternatives A and B because of their additional restrictions on discretionary actions and other resource uses.

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3.10 VISUAL RESOURCES

3.10.1 Affected Environment

Current Conditions

The visual resources of GSENM are highly scenic, highly valued by the public, exceedingly undeveloped, and intact. Many areas in GSENM possess a high degree of scenic quality and a high level of sensitivity to change. GSENM contains internationally recognized scenic destinations and draws an increasing number of visitors who come to the area to recreate and sightsee. The GSENM Recreation Experience Baseline Study (Casey 2018) documented that "scenic quality" was selected more than any other quality (60.9 percent) by focus group participants when asked, "What are the qualities of the place that make it special?". Additionally, the "wild, unspoiled and natural" (58.6 percent) and "remote and rugged" (42.5 percent) characteristics were also highly valued. In general, high scenic quality in GSENM is a result of the area's diverse vistas; extraordinary topography; dramatic, colorful, and unusual geology; abundance of canyons and waterways; varieties of vegetation; cultural and historic features; and lack of development.

The VRI for GSENM was completed in 2018 (BLM 2019). Almost 50 percent of GSENM inventoried as high scenic quality; less than 1 percent inventoried as low scenic quality. The highest-rated scenic quality unit inventoried on Utah BLM-managed lands is the Upper Escalante Unit (score of 28), which includes the upper reaches of the Escalante River, Calf Creek, and the lower reaches of Death Hollow. Almost 60 percent of GSENM inventoried as the public being highly sensitive to change in GSENM's landscape character; only 2 percent of the area inventoried had low public sensitivity to change in the landscape character. About half the area inventoried as being in the foreground-middleground distance zone (visible areas up to 5 miles from common viewing platforms, which include primary travel routes, communities, and viewpoints. About half of the area inventoried as being in seldom-seen locations due to landform screening or the distance from viewing platforms (beyond 15 miles).

Almost 50 percent of the lands in GSENM are in WSAs and are classified as VRI Class I. Without the administrative overlay of the VRI Class I classification of WSAs, more than 60 percent of the lands in GSENM inventoried as VRI Class II, the highest classification that results from combining scenic quality, public sensitivity, and proximity to viewing platforms, such as commonly used roads. Slightly more than 20 percent inventoried as VRI Class III. Less than 20 percent inventoried as VRI Class IV.

Table 3-57 to **Table 3-62** depict the different components of the BLM VRI, as well as the current BLM VRM classes for GSENM. Further, a series of maps (in **Appendix A**) display these data in GSENM's boundaries, as follows:

- **Figure 3-36:** Visual Resource Inventory Classes with Visual Resource Inventory Class I
- **Figure 3-37:** Visual Resource Inventory Classes without Visual Resource Inventory Class I
- **Figure 3-38:** Scenic Quality Rating Unit
- **Figure 3-39:** Sensitivity Level Rating
- **Figure 3-40:** Distance Zones
- **Figure 2-2:** Alternative A: Visual Resource Management

Table 3-57. BLM Visual Resource Inventory Classes with Visual Resource Inventory Class I

VRI Class	Acres (% of GSENM)
Class I	881,100 (47%)
Class II	550,300 (30%)
Class III	235,400 (13%)
Class IV	198,500 (10%)

Source: BLM 2019

Table 3-58. BLM Visual Resource Inventory Classes without Visual Resource Inventory Class I

VRI Class	Acres (% of GSENM)
Class II	1,154,800 (62%)
Class III	378,700 (20%)
Class IV	331,900 (18%)

Source: BLM 2019

Table 3-59. BLM Visual Resource Inventory Scenic Quality

Scenic Quality	Acres (% of GSENM)
Scenic Quality A Inventoried	870,100 (47%)
Scenic Quality B Inventoried	985,700 (52%)
Scenic Quality C Inventoried	9,600 (1%)

Source: BLM 2019

Table 3-60. BLM Visual Resource Inventory Sensitivity Levels

Sensitivity Level	Acres (% of GSENM)
Maintenance of the visual quality has high value	1,119,000 (60%)
Maintenance of the visual quality has moderate value	704,900 (38%)
Maintenance of the visual quality has low value	41,600 (2%)

Source: BLM 2019

Table 3-61. BLM Visual Resource Inventory Distance Zones

Distance Zone	Acres (% of GSENM)
Foreground-middleground	896,600 (48%)
Background	62,400 (3%)
Seldom seen	906,400 (49%)

Source: BLM 2019

Table 3-62. Current Visual Resource Management Classes

VRM Class	Acres (% of GSENM)
Class I	881,100 (47%)
Class II	422,300 (23%)
Class III	346,900 (19%)
Class IV	215,300 (11%)

Source: BLM 2020

Trends

Most of GSENM is undeveloped and exhibits intact, natural visual characteristics due to the remote, rugged, and inaccessible qualities of the area. Though not dominant, imprints on the land associated with management actions are visible, including transmission lines, roads, livestock grazing infrastructure, vegetation management, and recreational developments. Prior GSENM management decisions that limited large-scale development projects, tied to sparse population density and a large contiguous tract of BLM-managed lands with few inholdings, have resulted in a stable trend for maintaining the scenic quality since GSENM's 1996 designation.

The BLM analyzes all proposed projects or management actions in GSENM for their visual impacts and compliance with VRM class objectives. Projects are planned and designed to meet or exceed VRM class objectives so that projects blend with the natural landscape character and impacts on the visual environment are minimized. This approach has been and continues to be effective in maintaining GSENM's scenic quality.

Forecasts

It is forecasted that VRI values will remain mostly stable into the future. The likelihood of viewer sensitivity to landscape change increasing is higher than the likelihood of scenic quality ratings or distance zones changing. As undeveloped, naturally intact lands become scarcer throughout the country, as local development pushes closer to GSENM's boundaries, and as inholdings are developed, it is likely that national and local publics will become increasingly sensitive to changes in the landscape character in GSENM to the degree that sensitivity ratings will shift in some inventoried areas of moderate and low sensitivity. Increases in sensitivity are anticipated to rise due to both the increasing number of visitors and visitation expanding into lesser-known areas as popular destinations become overcrowded. The BLM assumes these factors will cause more of the landscape to be explored and valued by more visitors, compared with the existing condition.

Distance zones are established on important viewing platforms, such as primary travel corridors, communities, trails, and viewpoints. Though development along the edges of local communities is likely to

occur, and some internal GSENM travel corridors may become more popular with increased travel counts, the viewing platforms are assumed to remain mostly the same as were used in the inventory.

Anticipated future trends in visitation increases will likely result in the need for additional recreational infrastructure (trailheads, campgrounds, and trails). Based on past trends, additional livestock grazing infrastructure (such as fencing and water developments) and vegetation restoration projects will likely be implemented. It is anticipated that local- and regional-scale utility ROWs (buried and aboveground) will likely be authorized, if past trends continue. This range of development within the BLM's jurisdiction could result in increases in visual contrast throughout the decision area, especially in the foreground/midground distance zone. However, these types of facilities are not forecasted to be implemented in locations or at scales or densities that would cause scenic quality ratings to shift.

Factors that could also impact GSENM's scenic quality that are outside the BLM's influence or control are climate change and the development of adjacent and inheld non-BLM-managed lands. The development of inholdings and properties along GSENM's boundary for residential, commercial, and other uses is likely to continue and increase, resulting in changes to the landscape character in those interface zones. The intensifying drought and severe wildfires associated with climate change are forecasted to change vegetation (for example, dead and burned stands of trees, reduced shrub and grass cover, increasing insect and disease pressure, and reduced water availability), especially in shrubland, riparian, and pinyon-juniper woodland vegetation communities. They are also forecasted to reduce the presence of surface water, potentially to the degree that inventoried scenic quality values would shift.

3.10.2 Environmental Consequences

Refer to **Section F.15**, Visual Resources, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management affect inventoried visual values, including scenic quality, and the public's highly valued experience of enjoying scenery?

The geographic scope for visual resources corresponds to the visible area surrounding GSENM up to 15 miles beyond the boundary, which is associated with the limit of the background distance zone of the GSENM visual inventory. The temporary scope of the analysis is the life of the RMP. The BLM quantified the impacts on visual resources by identifying the potential effect on scenic quality resulting from different VRM class allocations. Changes to the characteristic landscape could decrease the scenic quality inventory key factor scores (specifically vegetation, adjacent scenery, and cultural modifications) and lead to diminishing scenic quality where the designated VRM class objectives would allow management activities to attract attention or dominate landscape character. **Figures 2-2 to 2-5** in **Appendix A** depict the VRM class allocations for each alternative.

Table 3-63 identifies the acres of VRM class allocations, by alternative, within scenic quality ratings inventoried in GSENM. To further highlight high scenic quality landscapes that could be modified by management activities—which would result in these activities attracting attention and potentially dominating the characteristic landscape—areas inventoried during the 2018 VRI with a scenic quality rating of A (high scenic value) with VRM Class III or IV allocations are identified in **Table 3-63** and discussed

Table 3-63. Summary of Scenic Quality Classes and Proposed Visual Resource Management Class by Alternative

Scenic Quality	Scenic Quality A Inventoried	Scenic Quality B Inventoried	Scenic Quality C Inventoried
Alternative A			
VRM Class I	546,400	333,600	1,100
VRM Class II	270,900	151,400	0
VRM Class III	51,700	293,100	1,700
VRM Class IV	1,100	207,400	6,800
Alternative B			
VRM Class I	590,000	363,900	1,100
VRM Class II	280,000	274,400	4,400
VRM Class III	100	4347,400	4,100
VRM Class IV	0	0	0
Alternative C			
VRM Class I	653,700	417,700	1,100
VRM Class II	216,400	421,200	7,800
VRM Class III	0	146,900	700
VRM Class IV	0	0	0
Alternative D			
VRM Class I	716,500	718,700	5,400
VRM Class II	153,600	267,000	4,200
VRM Class III	0	0	0
VRM Class IV	0	0	0

Source: BLM 2019; BLM GIS 2022

for each alternative in the following sections. Effects on other components of the GSENM VRI, including sensitivity levels and distance zones, are described by alternative, as applicable. Additional narrative discussions describe other potential impacts on visual resources, including specific viewsheds that would be further protected through VRM class allocations.

Impacts Common to All Alternatives

The protection, preservation, and enhancement of visual-specific GSENM objects would vary among the alternatives with differing levels of protection of landscapes through VRM class allocations and specific protective measures. Under all alternatives, the BLM allocates VRM Class I objectives to lands within WSAs, suitable segments classified as wild, and lands with wilderness characteristics managed to protect those characteristics, where decisions have been made to preserve a natural landscape. It should be noted that VRM Class I allocations are management decisions that are not necessarily commensurate with VRI Class I areas assigned via the inventory process. Increases in viewer sensitivity are anticipated under all alternatives as undeveloped, naturally intact lands become scarcer throughout the United States. The public will likely become increasingly sensitive to changes in landscape character in GSENM. The management prescriptions associated with the alternatives would not lead to measurable changes in sensitivity levels beyond continuation of existing trends and forecasts. No changes to BLM distance zones are anticipated; this is because no new primary travel corridors or other changes to major viewing platforms, from which BLM distance zones are established, would occur under any alternative.

Management for vegetation, forestry and woodland products, lands and realty, livestock grazing, range improvements, recreation, and transportation could result in direct and indirect impacts on visual resources. These types of management activities on BLM-managed lands could result in modest increases

in visual contrast, especially in the foreground/midground distance zones throughout the planning area. These activities are not forecasted to be implemented in locations or at scales or densities that would cause scenic quality ratings to shift especially where managed as VRM Class I or VRM Class II. Changes in scenic quality scoring factors, including landform modification, vegetation modification, or cultural modifications associated with these management activities, could reduce the scenic quality rating where managed as VRM Class III or IV, allowing for a greater level of visual contrast.

Changes to the scenic quality outside the BLM's influence or control, including climate change and development of adjacent non-BLM-managed lands, would continue to impact landscape character within GSENM, as described in above in *Affected Environment, Forecasts*.

Alternative A

As described under *Impacts Common to All Alternatives*, Alternative A assigns VRM Class I objectives to all lands within WSAs and WSRs, where previous administrative decisions have been made to preserve the natural landscape. To minimize impacts, to only allow management activities that retain the existing characteristic landscape, and to only allow management activities that would not attract a viewer's attention, 422,300 acres (23 percent) of GSENM are allocated as VRM Class II objectives. Similarly, 346,500 acres (19 percent) are allocated as VRM Class III objectives where management activities would partially retain the existing characteristic landscape and would not dominate views. As identified in **Table 3-63**, portions of scenic quality A inventoried landscapes are allocated as VRM Class III objectives under this alternative, where management activities would continue to be allowed to attract attention. This could modify the landscapes' scenic quality inventory key factor scores, which would result in a potential decrease in scenic quality in these areas. Specifically, this includes portions of the following scenic quality ratings units:

- Butler Valley/Big Dry Valley
- Circle Cliffs
- Henderson/Pardner/Mud Spring Canyons
- Straight Cliffs/Fiftymile Bench
- The Cockscomb
- Upper Gulch/Wolverine Bench
- Upper Kaiparowits Plateau
- Vermilion Cliffs/Paria-Hackberry
- Wahweap/Rimrocks
- White Cliffs
- Willis Creek

The BLM allocated 215,700 acres (12 percent) VRM Class IV objectives, where management activities could dominate the characteristic landscape and be the major focus for viewers. As identified in **Table 3-63**, portions of scenic quality A inventoried landscapes are allocated as VRM Class IV objectives under this alternative, specifically the Upper Kaiparowits Plateau scenic quality rating unit.

To enhance the scenic quality and the characteristic landscape, to the extent practicable and as the opportunity arises, existing visual contrasts remaining from past land uses would continue to be brought into conformance with allocated VRM class objectives.

Under Alternative A, temporary projects, such as research projects and meteorological monitoring stations, would continue to be allowed to exceed VRM class objectives, if the project terminates within 3 years of initiation with rehabilitation ongoing throughout project implementation or beginning at the end of the 3-year period. By allowing short-term contrast levels to exceed VRM class objectives, visual values would be impacted in GSENM, including a short-term reduction of scenic quality until rehabilitation has been successfully completed.

Alternative B

Under Alternative B, additional VRM Class I areas would protect more expansive lands with wilderness characteristics than under Alternative A. Alternative B also protects more scenic quality A inventoried areas with VRM Class I and II allocations than Alternative A (see **Table 3-63**). To minimize impacts on scenic quality A inventoried areas (except for the congressionally designed utility corridor along U.S. Highway 89) and to retain the natural landscape character, the BLM would allocate VRM Class II objectives to lands in VRI Class II areas within the BLM foreground and middleground distances of designated scenic routes, the area adjacent to the OSNHT Box of Paria high potential segment, and lands within the Willis Creek ACEC. All other lands would be allocated as VRM Class III objectives, including the designated utility corridor along U.S. Highway 89, to partially retain the existing landscape character. Because no lands would be managed under VRM Class IV objectives, no management activities would be allowed to dominate the view or be the major focus of viewer attention.

As identified in **Table 3-63**, a portion of a scenic quality A inventoried landscape would be allocated as VRM Class III objectives under this alternative, where management activities would be allowed to attract attention. This could modify the landscape's scenic quality inventory key factor scores, resulting in a potential decrease in scenic quality in these areas. Specifically, this includes a portion of The Cockscomb, which would be allocated as VRM Class III objectives based the presence of a congressionally designated utility corridor along U.S. Highway 89. The portion of The Cockscomb that would be allocated as VRM Class III objectives could be further modified through utility development; these future development projects would be required to partially retain the area's existing landscape character through as analyzed through the BLM contrast rating process to determine conformance with VRM Class III objectives.

To enhance the scenic quality and characteristic landscape, existing visual contrasts from past land uses would be reduced, to the extent possible, through appropriate mitigation measures. Compared with Alternative A, Alternative B would seek to reduce visual contrast for past land uses more universally, though past projects would not need to meet VRM class allocations under this alternative.

Under Alternative B, temporary projects, such as research projects, would be allowed to exceed VRM standards in Class II and III areas if the project terminates within 2 years of initiation with rehabilitation needing to occur at the end of this 2-year period. By allowing short-term contrast levels to exceed VRM class objectives, visual values would be impacted in GSENM, including a short-term reduction of scenic quality until rehabilitation has been successfully completed. These effects would be shorter in duration than under Alternative A. This because Alternative A identified a 3-year period for temporary projects, whereas Alternative B has a 2-year period.

Alternative C

Under Alternative C, additional VRM Class I areas would protect more expansive lands with wilderness characteristics within the primitive area, compared with Alternative A. Other portions of lands with wilderness characteristics, in the passage and outback areas, would be managed under VRM Class II objectives to retain their existing landscape character. Additionally, to minimize impacts on scenic quality A inventoried areas and to retain the natural landscape character, the BLM would allocate VRM Class II objectives to the lands within the BLM foreground and middleground distances of designated scenic routes and the area adjacent to the OSNHT Box of Paria high potential segment. All other lands in GSENM would be managed under VRM Class III objectives, where management actions would be required to partially retain the existing landscape character and may attract attention, but should not dominate the view.

Because no lands would be managed under VRM Class IV objectives, no management activities would be allowed to dominate the view or be the major focus of viewer attention. As identified in **Table 3-63**, there are no scenic quality A inventoried areas that would be allocated as VRM Class III or IV objectives under this alternative. It is not anticipated that management activities in these scenic quality A inventoried areas, allocated as either VRM Class I or II objectives, would result in modification of the scenic quality inventory key factor scores associated with these high-quality landscapes.

To enhance the scenic quality and characteristic landscape, existing visual contrasts from past land uses would be reduced, to the extent possible, through appropriate mitigation measures within the front country and passage areas. Further, within the outback and primitive areas, existing visual contrasts from past land uses would be brought into conformance with allocated VRM class objectives. Compared with Alternative A, Alternative C would seek to reduce the visual contrast for past land uses more universally and within the backcountry and primitive areas. Alternative C would also require past projects to meet VRM objectives, in the outback and primitive areas, which are more stringent than current management.

Under Alternative C, the effects of temporary projects, such as research projects, on visual resources would be the same as those described under Alternative B.

Alternative D

Under Alternative D, all of GSENM would be managed as VRM I or II, including additional VRM Class I areas to protect more expansive lands with wilderness characteristics, compared with Alternative A. Because no land would be managed under VRM Class III or IV objectives, no management activities would be allowed to attract attention, dominate the view, or be the major focus of viewer attention.

As identified in **Table 3-63**, there are no scenic quality A inventoried areas that would be allocated as VRM Class III or IV objectives under this alternative. It is not anticipated that management activities in these scenic quality A inventoried areas, allocated as either VRM Class I or II objectives, would result in modification of the scenic quality inventory key factor scores associated with these high-quality landscapes. Alternative D would also allocate the most acreage of scenic quality A inventoried areas as VRM Class I compared with all other alternatives. Because VRM Class I and II would be allocated across GSENM, the landscape character would be retained. Further, because only VRM Class I and II would be allocated under Alternative D, all landscapes within GSENM would be protected with the natural landscape character being retained. Any proposed future land uses would be required to not attract attention of the casual viewer.

To enhance the scenic quality and characteristic landscape, existing visual contrasts from past land uses would be brought into conformance with allocated VRM class objectives. Unlike Alternative A, Alternative D would require these past projects to meet the objectives associated with the VRM class allocations, which are more stringent than current management.

Under Alternative D, the effects of temporary projects, such as research projects, on visual resources would be the same as those described under Alternative B.

Cumulative Impacts

The cumulative impacts analysis area for visual resources is the visible area surrounding GSENM up to 15 miles beyond the boundary. This is the same as the direct and indirect effects analysis area, which corresponds to the background distance zone of the GSENM visual inventory. Views can extend beyond this distance, but the BLM chose this 15-mile distance because it represents the limit beyond which most anticipated development around GSENM would be visible to casual observers.

Past, present, and reasonably foreseeable future actions and conditions (**Appendix F**, Analytical Framework) in the cumulative impacts analysis area that have and would likely continue to adversely affect visual resources include development of non-BLM-managed inholdings and adjacent areas for residential, commercial, and other uses. Additionally, proposed utility ROW projects, mineral extraction, vegetation management, and renewable energy development, including the Lake Powell Pipeline, Garkane Transmission Line, Alton Coal, Rangeland Wells and Pipelines, Pine Hollow and Wire Pass fire stabilization projects, and solar development near Big Water, could result in additive, long-term effects on visual resources. Alternatives B, C, and D would offer more protection of visual resources than Alternative A.

Management of visual resources on BLM-managed lands may also be incompatible with visual management objectives on adjacent lands. Alternative A includes VRM Class IV objectives within the viewsheds of Glen Canyon and Bryce Canyon National Park; these Class IV objectives could result in adverse impacts on these NPS landscapes because management activities could dominate the characteristic landscape and be the major focus for viewers. Additionally, Alternative A includes VRM Class III objectives within the viewsheds of Glen Canyon, Bryce Canyon National Park, and Capitol Reef National Park; this could result in adverse impacts on these NPS landscapes where management activities would be allowed to attract attention of the casual viewer.

Alternatives B and C include smaller areas of VRM Class III objectives within the viewsheds of Glen Canyon, Bryce Canyon National Park, and Capitol Reef National Park compared with Alternative A. This would limit the potential effect on these adjacent NPS units. Because Alternative D would only allocate VRM Class I and VRM Class II objectives, it would protect viewsheds from the adjacent NPS units, including Glen Canyon, Bryce Canyon National Park, and Capitol Reef National Park.

3.10.3 References

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3.11 DARK NIGHT SKIES

3.11.1 Affected Environment

Current Conditions

Dark skies are an important and noteworthy attribute of the GSENM landscape. In 2016, an inventory conducted by a Weber State University and International Dark Skies team working under a GSENM science permit (UT-16-035-05-S) using satellite imagery and on-the-ground readings revealed that GSENM is one of the most naturally dark outdoor spaces of its size left in the lower 48 states. Based on light escaping to space, measurements from the Visible Infrared Imaging Radiometer Suite instrument aboard the Suomi National Polar-Orbiting Partnership satellite suggest that the night skies in over 90 percent of the planning area qualify under the descriptive term “pristine.” In such conditions, only natural sources of light, such as starlight, airglow, and aurora and zodiacal light, are visible to the human eye.

Ground measurements of zenith (directly above observer[s]) sky luminance (brightness) in GSENM supported that conclusion; excluding measurements around populated places around the edges of GSENM, the mean zenith luminance was 21.8 ± 0.06 magnitudes per square arcsecond, which is comparable with the lower limit of 21.9 to 22.0 magnitudes per square arcsecond established by natural night sky phenomena (International Dark-Sky Association and Ogden Valley Starry Nights Chapter 2016). On-the-ground readings of sky luminance were taken from 18 locations in and adjacent to GSENM; **Table 3-64** depicts these readings.

Table 3-64. Baseline Night Sky Quality Reading Locations – Existing Sky Luminance

Site Name	Sky Luminance Average
Big Spencer Flat	21.813
Big Water Visitor Center*	20.628
Boulder Town*	21.781
Burr Trail Scenic Backway	21.862
Butler Valley Viewpoint	21.548
Cannonville Visitor Center*	18.732
Circle Cliffs Overlook	21.934
Devil’s Garden	21.875
Escalante Visitor Center*	21.695
Kanab GSENM Headquarters*	18.542
Kanab Visitor Center*	17.485
Kitchen Wash: Big Bird Panel	22.186
New Home Bench	21.774
Paria Contact Station	21.767
Pet Hollow	21.812
Skutumpah Road	21.754
The Blues Overlook	21.816
Tropic Main Street*	17.890

Source: International Dark-Sky Association and Ogden Valley Starry Nights Chapter 2016

*Located outside the boundary of GSENM

Note: Higher numbers correspond to more pristine night skies.

Table 3-65 depicts the acres of GSENM where different thresholds of light pollution currently exist. The associated Bortle Scale²² classes are also noted for each existing light pollution level (the ratio of artificial sky brightness to natural sky brightness); these classes are defined as follows:

- Bortle Class 1: Excellent dark-sky site with pristine dark skies where the Milky Way and stars cast shadows with many deep sky objects being visible with the naked eye
- Bortle Class 2: Typical truly dark site where the background sky has a slightly gray shade due to atmospheric scattering or distant airglow on the horizon, where some deep sky objects are visible with the naked eye

Table 3-65. Existing Light Pollution (Ratio of Artificial Sky Brightness to Natural Sky Brightness)

Ratio of Artificial Sky Brightness to Natural Brightness (Bortle Class)	Acres
0.00–0.01 (Bortle Class 1)	1,863,500
0.01–0.02 (Bortle Class 2)	2,100

Source: Falchi et al. 2016

Note: Higher numbers correspond to locations with increased light pollution.

According to Falchi and others (2016), only 30.4 percent of the U.S. land area (much of it in Alaska) experiences this degree of natural darkness on a regular basis. The routinely seen “pristine” night skies in

²² The Bortle Scale is a nine-level numeric scale that measures the night sky’s and stars’ brightness at a particular location. Lower Bortle Classes correspond with pristine, dark night skies.

GSENM are now a rarity across the contiguous United States. **Figure 3-41** in **Appendix A** displays the existing light pollution in GSENM.

A 2016 inventory of fixed artificial light sources on developed structures in GSENM's boundaries revealed that fewer than 30 total lights exist in three locations (Citation Oil facility with 18 lights [6 poles with 3 lights per pole], Calf Creek Campground with 2 lights under the porches of the restroom and 2 lights inside each restroom, and 7 lights on the Paria Contact Station buildings). This inventory did not include lighting on private property inholdings. Dark night skies contribute to wilderness quality and character associated with opportunities for solitude and unconfined recreation. For more detail on the existing wilderness characteristics in GSENM, refer to **Section 3.20.6**, Wilderness Study Areas.

Trends

Development in the western United States is projected to continue to increase in coming decades. The nearest metropolitan area of more than 150,000 people is St. George, Utah. Situated approximately 125 straight miles from the core of the planning area, it is currently one of the fastest-growing cities in the country (Hemmersmeir 2021). The nearest large metropolitan areas are Las Vegas, Nevada (approximately 225 straight miles to the southwest) and Salt Lake City, Utah (approximately 300 straight miles to the north). Increasing development typically results in increased levels of light pollution; therefore, additional light pollution from peripheral and adjacent development areas is likely to be detected in GSENM. With increasing development throughout the western United States, it is anticipated that light pollution will continue to increase in the periphery of GSENM with further encroachment of light pollution into the edges of GSENM.

With 24 dark-sky designations, Utah surpassed Texas in 2015 with more International Dark Sky Places than any other state. GSENM is surrounded by several areas that protect night skies at a variety of scales, including Capitol Reef, Bryce Canyon, and Canyonlands National Parks; Kodachrome Basin State Park; and Torrey Town.

Gateway communities to areas with dark night skies are experiencing increasing visitation and economic development opportunities associated with astrotourism (Mitchell and Gallaway 2019), such as dark-sky festivals hosted by the region's national parks. Such activities are currently hosted in the Bryce area to the west, in the Torrey area to the northwest, and in the Page, Arizona, area to the southeast. The communities of Kanab and Boulder have both passed ordinances that seek to protect against light pollution.

In response to increased interest from the public regarding protection of dark night skies, the BLM has developed Technical Note 457, Night Sky and Dark Environments: Best Management Practices for Artificial Light at Night on BLM-Managed Land (BLM 2023). This technical note provides a background on night sky values and terminology, types of potential effects resulting from increased light pollution, and comprehensive technical guidance on practical methods for reducing the impacts from artificial outdoor lighting associated with proposed projects (or activities), including the identification of specific BMPs.

Forecasts

Outside GSENM, the towns and cities on the immediate periphery (for example, Escalante, Boulder, and Henrieville) and those farther away (for example, St. George and Las Vegas) are anticipated to continue to expand with residential, commercial, and industrial development and associated artificial lighting. This

growth is forecast to increase the encroachment of light pollution into the edges of GSENM. Based on existing trends, the BLM anticipates that public concerns for protecting dark-sky resources on BLM-managed lands will continue and increase.

3.11.2 Environmental Consequences

Refer to **Section F.16**, Dark Night Skies, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management actions under the alternatives affect dark night skies?

The geographic scope for dark night skies corresponds to the planning area and adjacent communities producing light pollution in GSENM. The temporal scope of the analysis is the life of the RMP. The BLM assessed the impacts on dark night skies by identifying the extent of GSENM where lighting restrictions would occur to protect dark night skies, as well as where lighting would be prohibited. By identifying the areas where lighting would be restricted or prohibited, the extent of protection for dark night skies can be quantified for each alternative. There would be no areas with lighting restrictions or prohibitions in GSENM under Alternative A. Under Alternative B, C, and D, 1,865,600 acres would have lighting restrictions, but there would be no areas of lighting prohibitions. Additional narrative discussions identify other potential impacts on dark night skies associated with each alternative.

Impacts Common to All Alternatives

The protection, preservation, and enhancement of the dark night sky would vary among the alternatives, with varying levels of protection for dark night skies through additional protective measures and by identifying where outdoor lighting would be prohibited in GSENM.

Based on the release of BLM Technical Memo 457 (BLM 2023), strategies to reduce light pollution would be applied during planning and design of projects (or other management actions) located on BLM-managed lands both within and outside of GSENM, resulting in protection of GSENM dark night skies. Because the BLM does not have the ability to restrict or prohibit lighting on non-BLM-managed lands outside GSENM, impacts on dark night skies from adjacent communities would occur regardless of the alternative selected. The communities of Kanab and Boulder have passed ordinances that seek to protect against light pollution, likely resulting in less expansion of light pollution in these areas.

Alternative A

Under Alternative A, existing trends for dark night skies would continue. The goal would be to manage uses to protect the quality of dark night sky resources through application of BMPs, as outlined in the 2020 GSENM RMPs (BLM 2020a) and the KEPA RMP (2020b). The BLM would continue to inventory and monitor night skies in partnership with local communities and stakeholders. There would be no acres within GSENM where lighting would be further restricted and where outdoor lighting would be prohibited. Because this alternative does not include further night-lighting restrictions or prohibit outdoor lighting in specific areas, current trends of increasing light pollution within GSENM would continue, and the enhancement of dark night sky resources through additional protections would not occur. Under Alternative A, there would be no management direction to seek International Dark Sky Place status; therefore, the associated astrotourism economic benefits would not be realized.

Alternative B

Dark night skies would be more protected under Alternative B than under Alternative A. Alternative B establishes the objective to manage outdoor lighting fixtures to protect the quality of dark night skies. Specifically, outdoor lighting fixtures would only be allowed for public safety with a set of BMPs (see **Appendix C**) for any new lighting; these BMPs would analyze whether the lighting is necessary, assess lighting's impacts on the adjacent area, focus lighting only where it is needed, limit the brightness of installed lighting, only illuminate fixtures when it is useful, and use warmer-spectrum lighting.

The BLM would manage the entirety of the GSENM decision area (1,865,600 acres) where lighting would be further restricted. There would be no areas where outdoor lighting would be prohibited. Because Alternative B would introduce additional night-lighting restrictions, this alternative would further protect, preserve, and enhance dark night sky resources compared with Alternative A. Under Alternative B, the BLM would seek to acquire International Dark Sky Place status for GSENM, which would further prioritize management of dark night skies. Based on the additional status this designation would grant GSENM, there would be a potential increase in visitation and economic development opportunities associated with astrotourism to experience pristine night skies.

Alternative C

Impacts on dark night skies under Alternative C would be similar to those described under Alternative B. In addition to the effects described under Alternative B, any existing exterior artificial light fixtures would be removed, replaced, or retrofitted to meet the same BMPs, where possible.

Alternative D

Impacts on dark night skies under Alternative D would be to the same as those described under Alternative C.

Cumulative Impacts

The cumulative impacts analysis area for dark night skies corresponds to the planning area and adjacent communities producing light pollution in GSENM. Past, present, and reasonably foreseeable future actions and conditions (**Appendix F**, Analytical Framework) in the cumulative impacts analysis area that have and would likely continue to adversely affect dark night skies include artificial lighting associated with residential, commercial, and industrial developments, as well as some recreational activities, like camping in developed areas. For example, the Calf Creek Recreation Site Deferred Maintenance and Improvements Project would likely increase overnight use in this area, and the additional light from campfires and other sources of artificial light at night could contribute to light pollution. Towns and cities adjacent to GSENM, as well as those farther away, are anticipated to continue to grow and lead to further encroachment of light pollution into the edges of GSENM.

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3.12 NATURAL SOUNDSCAPES

3.12.1 Affected Environment

Current Conditions

Table 3-66 and **Figure 3-42 (Appendix A)** display the existing modeled sound levels in GSENM (NPS 2021) with examples of common sounds to correlate the different sound levels. These are based on L50, a descriptor of loudness, which represents the existing ambient noise levels where the sound level is exceeded 50 percent of the time. Data developed by the U.S. Department of Transportation as part of the National Transportation Noise Map Project (U.S. Department of Transportation 2020) provide additional context for existing noise levels in GSENM along rural highways and other roadways, which was not specifically included in the NPS modeling and has the potential to affect areas adjacent to these roadways. In general, the U.S. Department of Transportation data show that primary roads with higher speed limits, such as U.S. Highway 89 and State Route 12, produce more noise compared with interior roads in GSENM, such as Cottonwood Canyon Road and Skutumpah Road. It is important to note that the intended use of these data is tracking noise trends; the data should not be used to evaluate noise levels in individual locations or at specific times.

Table 3-66. Existing Modeled L50 Sound Levels (A-weighted Decibels [dBA])

Sound Level dBA (example)	Acres in GSENM
Less than 25 dBA (rustling leaves and normal human breathing)	884,500
25–30 dBA (quiet whisper and ticking watch)	978,700
More than 30 dBA (refrigerator hum and quiet library)	2,500

Source: NPS 2021

From 2014 to 2017, Southern Utah University documented the acoustic baseline using sound level meters and digital audio recorders in various locations across GSENM. These locations were based on acoustic/biological/geographic zones, visitor use areas, and WSAs. The highest percentages of human-caused noise in GSENM are created by high-altitude jets and visitors at popular recreation areas, including Calf Creek, Dry Fork, Devil’s Garden, Dance Hall Rock, and the Paria townsite. Additionally, the use of drones for recreational and scientific purposes generates increased noise levels while in use, especially when flying at low altitude. Several monitored sites were found to be within the range of the quietest locations monitored in the lower 48 states, based on exceedingly low decibel levels. Recorded decibel levels were quiet enough at several monitored locations, approaching the noise floor of the acoustic equipment, that the use of high-sensitivity acoustic equipment was required to accurately document the sound level.

As a comparison, the lowest natural quiet measurement in the planning area was recorded at 5.7 dBA at Dry Fork (site GSENM016), whereas two very quiet national parks, Great Sand Dunes National Park in Colorado (8.7 dBA) and Haleakala National Park in Hawaii (10 dBA), had higher decibel readings. A large portion of GSENM is very quiet (less than 30 dBA, which equates to a quiet whisper or a ticking watch); several areas are some of the quietest locations that have been monitored in the lower 48 states, as identified in an existing condition acoustic baseline study conducted by Southern Utah University (Southern Utah University 2020). **Table 3-67** and **Figure 3-42** in **Appendix A** include the sites where baseline acoustic monitoring has been conducted within GSENM, as identified in the existing condition acoustic baseline study, including measured L50 levels.

Table 3-67. Baseline Acoustic Monitoring Locations – Existing L50 Sound Levels (A-weighted Decibels)

Site Number	Site Name	Season	Day/Night	L50 (dBA)
GSENM001	Calf Creek	Fall	Day	30.3
			Night	32.6
GSENM001	Calf Creek	Winter	Day	33.3
			Night	33.7
GSENM002	Deer Creek	Fall	Day	23.8
			Night	31.5
GSENM002	Deer Creek	Winter	Day	24.2
			Night	24.2
GSENM003	Dry Fork	Fall	Day	16.9
			Night	15.6
GSENM004	Dance Hall Rock	Fall	Day	23.2
			Night	23.0

Site Number	Site Name	Season	Day/Night	L50 (dBA)
GSENM005	Paria Townsite	Winter	Day	17.7
			Night	15.7
GSENM006	Wahweap Hoodoos	Winter	Day	20.2
			Night	15.5
GSENM006	Wahweap Hoodoos	Spring	Day	22.9
			Night	17.2
GSENM007	Lower Hackberry	Spring	Day	24.0
			Night	26.8
GSENM008	Yellow Rock	Summer	Day	20.2
			Night	33.6
GSENM009	Phipps Arch	Summer	Day	21.8
			Night	21.0
GSENM010	Willis Creek	Summer	Day	24.1
			Night	20.6
GSENM010	Willis Creek	Fall	Day	20.7
			Night	18.7
GSENM011	Upper Escalante River	Fall	Day	30.4
			Night	31.5
GSENM012	Kaiparowits Plateau	Fall	Day	17.4
			Night	13.5
GSENM012	Kaiparowits Plateau	Winter	Day	15.5
			Night	13.2
GSENM013	Devil's Garden	Spring	Day	24.0
			Night	16.0
GSENM014	No Mans Mesa	Spring	Day	26.2
			Night	24.2
GSENM014	No Mans Mesa	Summer	Day	27.1
			Night	29.7
GSENM015	Wolverine Petrified	Fall	Day	17.9
			Night	14.8
GSENM015	Wolverine Petrified	Winter	Day	16.3
			Night	14.6
GSENM016	Dry Fork (sensitive microphone)	Winter	Day	13.4
			Night	10.0
GSENM017	Dry Fork (signage)	Summer	Day	20.6
			Night	31.3

Source: Southern Utah University 2020

Trends

Natural soundscape resources are increasingly of public concern; they were noted during scoping for planning efforts and review of proposed projects on BLM-managed lands. Increasing awareness of GSENM's recreational opportunities and high-quality landscapes, partially through social media, are resulting in increased visitation along travel corridors and in quiet, backcountry areas. Increases in noise are anticipated to continue as recreational visitation and air travel increase in GSENM. Scenic overflights in places like nearby Grand Canyon National Park, and the use of drones for recreational and scientific purposes have increased in recent years.

Forecasts

With increasing recreational use and air travel (identified as the main generators of human-caused noise in GSENM based on the GSENM 2020 Acoustic Baseline Report; Southern Utah University 2020), as well

as other noise-producing activities (for example, vehicle travel, including OHVs), it is anticipated GSENM's acoustic environment will become less quiet over time. Specifically, primary and secondary travel corridors would become less quiet with an increase in visitation and vehicle use. The demand for scenic overflights on nearby national parks suggests that the demand for that use could occur at GSENM; this would result in less quietness.

The demand for use of drones for recreational and scientific purposes is forecast to continue. In accordance with the National Parks Air Tour Management Act of 2000, the NPS has been developing air tour management plans to reduce noise impacts over the parks, including the portion of GSENM within 0.5 miles of Bryce Canyon National Park (the northwest corner of GSENM adjacent to Cannonville and Henrieville), Capitol Reef National Park (the northeast corner of GSENM), and Glen Canyon (the east and southeast edges of GSENM). The Bryce Canyon Air Tour Management Plan was finalized in October 2022; this plan manages flights below 5,000 feet above ground level and adjacent to geographic features within the park up to 0.5 miles into adjacent lands. This plan includes the identification of fixed wing and helicopter routes that cross the northwest corner of GSENM, potentially increasing noise levels along these routes as aircraft approach Bryce Canyon National Park (NPS 2022).

3.12.2 Environmental Consequences

Refer to **Section F.17**, Natural Soundscapes, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management affect natural quiet soundscapes?

A 3-mile distance beyond the GSENM boundary is used as the geographic scope for natural soundscapes and is based on the attenuation of a typical OHV (75 dBA) to levels acceptable in GSENM (30 dBA). The temporal scope of the analysis is the life of the RMP. The BLM assessed impacts on soundscapes by comparing the area (in acres) where noise-producing facilities would be prohibited with existing modeled noise levels of less than 25 dBA, 25 to 30 dBA, and more than 30 dBA across GSENM. This includes the areas where OHV use and noise-producing facilities would not be allowed under each alternative, as described in **Chapter 2** and **Table 3-68**. By identifying the acres where noise-producing facilities are prohibited, compared with the existing soundscape conditions, the extent of the soundscape protected by each alternative can be quantified, including where existing soundscapes are highly intact. This analysis does not consider the extent of OHV use in these areas, but instead focuses on the extent of protection of soundscapes through closing areas to OHV use. The assessment of impacts from drone use and aircraft landing areas is described qualitatively based on management direction associated with each alternative.

Additionally, to identify soundscapes most at risk, soundscape monitoring locations, developed as part of the GSENM Baseline Acoustic Monitoring Report (Southern Utah University 2020), are listed by alternative where noise-producing facilities could occur. The NPS-modeled sound level data were compared with the sound levels measured at GSENM soundscape monitoring locations to cross-check the data and acknowledge any differences between these data. Overall, the modeled sound level and monitored sound levels are within 5 dBA, which equates to being just above the perceptible difference for the average person, demonstrating that the NPS-modeled sound data provide a general sense of existing noise levels. For context, 3 dbA is the threshold for humans to identify different noise levels. It is important

Table 3-68. Existing Modeled L50 Sound Levels (A-weighted Decibels) and Areas Where Different Noise-Producing Facilities are Prohibited by Alternative

Alternative Area	Less than 25 dBA (Acres)	25–30 dBA (Acres)	More than 30 dBA (Acres)
Alternative A			
No noise-generating facilities	0	0	0
Closed to OHV use	300	2,500	0
Alternative B			
No noise-generating facilities	458,200	495,700	500
Closed to OHV use	441,600	511,000	400
Alternative C			
No noise-generating facilities	568,800	553,400	300
Closed to OHV use	622,000	587,400	500
Alternative D			
No noise-generating facilities	884,300	978,400	2,500
Closed to OHV use	814,000	822,800	2,000

Source: BLM GIS 2022; NPS 2021

to note that one site, Calf Creek (site GSENM0001), was monitored to be noisier than the modeled data. Also, several sites were monitored to be quieter than the modeled data; specifically, Dry Fork (site GSENM016) measured more than 15 dBA quieter than the modeled data. Additional monitoring locations found to be quieter than the modeled data include Dance Hall Rock (site GSENM004), Paria Townsite (site GSENM005), Phipps Arch (site GSENM009), Kaiparowits Plateau (site GSENM012), Devil's Garden (site GSENM013), and Wolverine Petrified (site GSENM015).

Further narrative discussions identify other potential impacts on soundscapes associated with each alternative.

Impacts Common to All Alternatives

The protection, preservation, and enhancement of natural soundscapes would vary among the alternatives with varying levels of additional protective measures and identification of where different noise-producing uses would be prohibited in GSENM. All alternatives include increasing public awareness and appreciation of—and engagement with—natural soundscape resources.

Because the BLM does not have the ability to restrict travel on rural highways (such as U.S. Highway 89 and State Route 12), noise generated along these travel corridors would continue under all alternatives; this would continue affecting GSENM soundscapes.

Alternative A

Existing trends for soundscapes would continue under Alternative A. The goal would continue to be managing uses to protect the quality of natural soundscapes through application of BMPs, as outlined in the 2020 GSENM RMPs (BLM 2020a) and the KEPA RMP (2020b), with more specific direction to be included in the forthcoming natural soundscape management plan. Increasing use along primary and secondary travel routes would continue, resulting in the areas adjacent to these routes becoming less quiet over time. Additionally, the use of OHVs in open and limited use areas, as well as the ability to take off and land drones in most locations within GSENM, would continue to result in increased noise levels where these uses occur.

Table 3-68 identifies the acres under Alternative A, by existing noise threshold, where OHV use and noise-producing facilities are prohibited; this highlights the extent of protection for existing soundscapes under this alternative. It is important to note that under Alternative A, WSAs would continue to be managed as limited OHV use areas; however, no new routes could be developed in these areas (and no drone use is allowed), resulting in these portions of GSENM being further protected from increased noise levels beyond what is shown in **Table 3-68**. Alternative A does not identify management direction related to landing areas or landing strips for aircraft, which could lead to increased noise in GSENM soundscapes during takeoffs and landings adjacent to the one maintained airstrip in GSENM (New Home Bench airstrip). Also, because this alternative does not include the establishment of quiet hours at campgrounds, designated camping locations, and other locations, potential intermittent noise from generators associated with recreational use would continue to impact soundscapes where concentrated recreation use occurs.

Overall, proposed management actions under this alternative have the potential to impact soundscapes within GSENM because no areas are identified where noise-producing facilities are prohibited, including drone takeoffs and landings, as well as not further limiting where OHV use could occur.

Alternative B

Existing soundscapes would be more protected under Alternative B than under Alternative A. The goal under Alternative B would be to protect the quality of natural soundscapes. To protect existing soundscapes, noise-generating facilities would be prohibited in WSAs, lands with wilderness characteristics managed to protect those characteristics, RNAs (ACECs), ACECs, and other areas. Short-term anthropogenic noise would be kept below 75 dBA, and long-term anthropogenic noise would be kept below 55 dBA (observed L50 sound level) at no more than 50 feet from the source. Alternative B would identify the establishment of quiet hours at developed campgrounds, resulting in a reduction of potential intermittent noise associated with recreation users' generators.

Alternative B would also have a requirement to install sound-attenuation features for any approved uses that generate noise. The use of OHVs in limited use areas (there are no open use areas under Alternative B) would result in increasing noise levels within these portions of GSENM. Based on management direction, increased noise levels could occur outside WSAs, lands with wilderness characteristics managed to protect those characteristics, RNAs (ACECs), and ACECs, or in OHV limited use areas, near the following identified noise monitoring locations:

- Calf Creek (GSENM001)
- Paria Townsite (GSENM005)
- Lower Hackberry (GSENM007)
- Yellow Rock (GSENM008)
- No Mans Mesa (GSENM014)
- Wolverine Petrified (GSENM015)

Table 3-68 identifies the acres under Alternative B, by existing noise threshold (see **Figure 3-42**, Existing Soundscape Conditions, in **Appendix A**), where OHV use and noise-producing facilities would be prohibited (OHV use under Alternative B is shown on **Figure 2-27**, Alternative B: Travel and Transportation Management, in **Appendix A**); this highlights the extent of protection for existing soundscapes under this alternative. By only allowing drones to take off or land along designated OHV

routes in OHV limited areas assigned for the activity via implementation-level travel planning, Alternative B would facilitate the protection of soundscapes throughout GSENM by focusing drone use where other human-generated noise would occur. Additionally, not allowing drones to take off or land within 300 feet of recreation facilities, as well as the establishment of quiet hours at campgrounds, designated camping locations, and other locations, would further protect soundscapes where concentrated recreation use occurs. This includes potential intermittent noise from generators associated with recreational use.

Alternative B includes management direction regarding the identification of appropriate landing areas or landing strips for aircraft; however, it would not specifically prohibit any portion of GSENM from this use. Identification of additional landing areas and landing strips for aircraft could allow for increased aircraft access compared with Alternative A, resulting in a potential increase in noise levels in areas adjacent to any new proposed landing areas.

To protect natural soundscapes, existing uses that generate sounds would be retrofitted to reduce sound generated below the identified thresholds, to the extent possible, which would not be completed under Alternative A.

Alternative C

Existing soundscapes would be more protected under Alternative C than under Alternative A. Like Alternative B, the goal under Alternative C would be to protect the quality of natural soundscapes. Alternative C would identify the establishment of quiet hours at developed campgrounds, resulting in a reduction of potential intermittent noise associated with recreation users' generators. To protect existing soundscapes, noise-generating facilities would be prohibited in the primitive area. Within the front country area, sound-attenuation features would be required for any approved uses that generate noise to keep short-term anthropogenic noise below 75 dBA and long-term anthropogenic noise below 55 dBA (observed L50 sound level) at no more than 50 feet from the source. For the passage and outback areas, sound-attenuation features would be required for any approved uses that generate noise, to keep noise below 10 dBA above the L90 measured background sound level at no more than 50 feet from the source. The use of OHVs in limited use areas (there are no open areas under Alternative C) would result in increasing noise levels within these areas. In particular, increased noise levels could occur near the following identified noise monitoring location:

- Calf Creek (GSENM001)

Table 3-68 identifies the acres under Alternative C, by existing noise threshold (see **Figure 3-42**, Existing Soundscape Conditions, in **Appendix A**), where OHV use and noise-producing facilities would be prohibited (OHV use under Alternative B is shown on **Figure 2-28**, Alternative C: Travel and Transportation Management, in **Appendix A**); this highlights the extent of protection for existing soundscapes under this alternative. By not allowing drones to take off or land within 300 feet of recreation facilities in the front country and passage areas, as well as focusing drone landings and takeoffs along designated OHV routes in OHV limited areas and prohibiting takeoff and landing of drones without a permit in all outback and primitive areas, Alternative C would facilitate further protection of existing soundscapes within these management areas. Additionally, like under Alternative B, the establishment of quiet hours at campgrounds, designated camping locations, and other locations would further protect soundscapes where concentrated recreation use occurs; this includes potential intermittent noise from generators associated with recreational use.

Alternative C includes management direction regarding the identification of appropriate landing areas or landing strips for aircraft. This use would be prohibited in the GSENM primitive area, which would further protect soundscapes in these areas, compared with Alternative B. To protect natural soundscapes, existing uses that generate sounds would be retrofitted to reduce sound generated below the identified thresholds, to the extent possible.

Alternative D

Existing soundscapes would be more protected under Alternative D than under Alternative A. Like Alternatives C and D, under Alternative D, the goal would be to protect the quality of natural soundscapes. Alternative D would identify the establishment of quiet hours at developed campgrounds, resulting in a reduction of potential intermittent noise associated with recreation users' generators. To protect existing soundscapes, noise-generating facilities would be prohibited outside developed campgrounds (defined in the analysis as the area within 0.25 miles of campgrounds). The use of OHVs in limited use areas (there are no open areas under Alternative D) would result in increasing noise levels within these areas. Increased noise levels are not anticipated to occur near any of the noise monitoring locations identified in **Table 3-67**.

Table 3-68 identifies the acres under Alternative D, by existing noise threshold (see **Figure 3-42**, Existing Soundscape Conditions, in **Appendix A**), where OHV use and noise-producing facilities would be prohibited (OHV use under Alternative D is shown on **Figure 2-29**, Alternative D: Travel and Transportation Management, in **Appendix A**); this highlights the extent of protection for existing soundscapes under this alternative. By not allowing drones to take off or land in GSENM without a permit issued by the BLM Authorized Officer, Alternative D would facilitate the protection of existing soundscapes throughout GSENM. Additionally, like Alternatives B and C, the establishment of quiet hours at campgrounds, designated camping locations, and other locations would further protect soundscapes where concentrated recreation use occurs; this includes potential intermittent noise from generators associated with recreational use.

Alternative D would include management direction regarding the identification of appropriate landing areas or landing strips for aircraft. However, it would not specifically prohibit any portion of GSENM from this use, resulting in similar impacts as Alternative B. To protect natural soundscapes, existing uses that generate sound would be retrofitted to reduce sound generated below 10 dBA above the L90 measured background sound level at no more than 50 feet from the source.

Cumulative Impacts

The cumulative impacts analysis area for natural soundscapes corresponds to the planning area and the area within 3 miles of the planning area. Past, present, and reasonably foreseeable future actions and conditions (**Appendix F**, Analytical Framework) in the cumulative impacts analysis area that have and would likely continue to adversely affect natural soundscapes include recreation uses (for example, OHVs or generators at recreation sites); air travel, including scenic overflights; travel along primary and secondary corridors; and drone use for recreational and scientific purposes. Additionally, proposed utility ROWs, mineral extraction, and road construction projects, including the Lake Powell Pipeline and Skutumpah Road paving, would generate additional noise during their construction and operation in and adjacent to GSENM.

Implementation of air tour management plans for adjacent NPS units could result in increased, additive noise along the periphery of GSENM where GSENM is within 0.5 miles of Bryce Canyon National Park, Capitol Reef National Park, and Glen Canyon. The Bryce Canyon Air Tour Management Plan (NPS 2022) identified fixed wing and helicopter routes across the northwest corner of GSENM; this could result in potential increased noise in the areas west of Cannonville and the Skutumpah Road, near Bryce Canyon National Park, during scenic overflights.

3.12.3 References

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3.13 FIRE AND FUELS MANAGEMENT

3.13.1 Affected Environment

Current Conditions

Current and desired fire management resource conditions can be described by fire regime groups (FRGs)²³ and VCCs²⁴. This departure from the historical conditions can be a result of changes in one or more ecosystem components, such as fuel composition, fire frequency, or other ecological disturbances.

Fire Regime Groups

Table 3-69 characterizes each FRG and summarizes the decision area acres in each group. Most acres are in FRGs I, II, and V. This is largely driven by the dominant vegetation types found in GSENM (sagebrush, salt desert scrub, pinyon-juniper, and oak; see **Section 3.3**, Vegetation). The dominance of FRGs I, II, and V, along with the vegetation types found in these groups, is predictive of future mixed-severity, large-scale wildfire.

Table 3-69. Fire Regime Groups

Fire Regime Group	Fire Frequency	Fire Severity ¹	Acres	Percent of Decision Area
I	0–35 years	low	241,700	13
II	0–35 years	stand replacement	1,041,900	56
III	35–200 years	mixed	0	0
IV	35–200 years	stand replacement	100	0
V	200+ years	stand replacement	568,600	31

Source: BLM GIS 2022; National Wildfire Coordinating Group 2022

¹ Fire severity is the degree to which a site has been altered or disrupted by fire and is dependent on fire intensity and burn time. A stand-replacing fire kills all or most of the living overstory trees or shrubs. Low- and mixed-severity fires kill few or some living overstory trees or shrubs, respectively.

Vegetation Condition Class

GSENM acres in each VCC are summarized in **Table 3-70**. Sixty percent of GSENM is moderately or highly departed (class IIA and IIB) from historical fire conditions as less fire occurs now compared with historical conditions. Fuel loading because of fire suppression has increased the susceptibility of vegetation and other resources to large-scale, catastrophic fires. This issue is compounded by the challenges of prescribed fire as a tool in many situations (see *Prescribed Fire Treatments*, below). The *Current Conditions–Ecological Context* discussion in **Section 3.3**, Vegetation, provides more detailed information on how fire regimes differ from historical conditions and how this has affected the current vegetation and contributes to altered fuel conditions in GSENM.

²³ A classification of fire regimes into a discrete number of categories based on frequency and severity. The national, coarse-scale classification of fire regime groups commonly used includes five groups: I - frequent (0–35 years), low severity; II - frequent (0–35 years), stand replacement severity; III - 35–100+ years, mixed severity; IV - 35–100+ years, stand replacement severity; and V - 200+ years, stand replacement severity (National Wildfire Coordinating Group 2022).

²⁴ VCC indicates the general level to which current vegetation is different from the estimated historical vegetation conditions (LANDFIRE 2022). Historical conditions are generally considered to be prior to Euroamerican contact.

Table 3-70. Vegetation Condition Classes

VCC	Departure	Acres	Percent of Decision Area*
IA	Very low, vegetation departure 0%–16%	96,300	5
IB	Low to moderate, vegetation departure 17%–33%	282,800	15
IIA	Moderate to low, vegetation departure 34%–50%	891,400	48
IIB	Moderate to high, vegetation departure 51%–66%	198,700	11
IIIA	High, vegetation departure 67%–83%	23,300	1

Source: BLM GIS 2022; LANDFIRE 2022

* Percentages do not add up to 100 because portions of GSENM were mapped as agriculture, barren, urban, or water and thus do not fall into VCCs.

Fire Occurrence

Fire occurrence in GSENM between 2000 and 2022 is shown in **Table 3-71**. Because much of GSENM is remote, there have been relatively few human-caused fires over this time period. Human-caused fires have burned about 540 acres (43 fires total). Most fires were naturally ignited by lightning (511 total) and burned about 10,500 acres. However, the total acres burned (11,040 acres) reflects a small portion (less than 1 percent) of the total acres in GSENM. This is likely due to fire suppression tactics that have been implemented since Euroamerican contact. **Figure 3-43**, Fire Occurrence, in **Appendix A** shows the distribution and type of fire ignition points in GSENM.

Table 3-71. Fire Occurrence from 2000 to 2022 by Ignition Source

Year	Lightning		Human	
	Number of Fires	Acres ¹	Number of Fires	Acres ¹
2000	1	740	3	70
2001	24	10	3	<10
2002	25	10	3	10
2003	38	<10	0	0
2004	53	2,430	0	0
2005	26	<10	2	10
2006	53	1,590	4	<10
2007	27	<10	1	<10
2008	32	10	0	0
2009	39	10	3	<10
2010	30	<10	1	<10
2011	29	<10	2	10
2012	45	<10	0	0
2013	27	<10	3	<10
2014	8	20	2	<10
2015	17	10	3	<10
2016	11	<10	0	0
2017	13	<10	3	<10
2018	2	140	0	0
2019	1	300	3	380
2020	4	5,530	3	70
2021	6	400	3	<10
2022	0	0	4	<10
Total	511	10,500	43	540

Source: BLM GIS 2022

Notes:

¹ Rounded to the nearest 10 acres

Fuels Management, including Prescribed Fire

The number of fuels projects has increased in recent years. The BLM's fuels management program primary goals are to address hazardous fuels issues, which include 1) providing for resilient and resistant landscapes by restoring and/or improving the VCC; 2) protecting fire-adapted communities by reducing fire hazard, with an emphasis on wildland-urban interface areas; and 3) improving safe and effective wildfire response. These goals are accomplished through interdisciplinary partnerships, such as the Utah Watershed Restoration Initiative. These partnerships identify focal watersheds to address a variety of interdependent resource issues and improve long-term watershed conservation and restoration. These watersheds are then targeted and prioritized for funding through BLM program dollars, with additional coordination and funding prioritized through the Utah Watershed Restoration Initiative.

Management actions have mainly included mechanical treatments (hand thinning, hand piling, harrow, Ely chaining, and mechanical mulching). Locations of vegetation management activities in GSENM are shown on **Figure 3-17**, Vegetation Management Methods, in **Appendix A**. In addition to meeting goals set forth in the hazardous fuels program, numerous other resource benefits are realized, such as improved watershed conditions, forest and rangeland health, and wildlife habitat. Seeding is used in conjunction with each treatment, where appropriate.

Due to past and current climate conditions and fire suppression, fuel loads have increased across broad portions of GSENM. This poses fuels management challenges in terms of the method (for example, prescribed fire) and outcomes (for example, the potential for noxious and invasive vegetation infestations), as well as management of human safety during wildfire response. In summary, sagebrush-steppe landscapes have shifted toward landscapes with higher covers of woodlands and invasive annual grasses, increasing fuel loads above historical levels. The *Current Conditions–Ecological Context* discussion in **Section 3.3**, Vegetation, provides a detailed overview of the types and causes of vegetation departure from historical conditions and how this contributes to altered fuel conditions in GSENM. More information is included in the *Trends* section, below.

Prescribed fire has played a limited role in GSENM over the past 20 years. The largest factor that makes it difficult to plan prescribed burns is increased and unnatural fuel loading, as described above. Tourism and protection of GSENM objects also factor into prescribed fire management decisions. Prescribed fire has only been used on a total of 1,273 acres in GSENM over the past 20 years (BLM GIS 2022). Typically, mechanical vegetation management are required to bring fuel conditions closer to historical conditions prior to implementing the use of prescribed fire.

Emergency Stabilization and Rehabilitation

There is an active emergency stabilization and rehabilitation program in the Color Country and Paria River Fire and Aviation Management Unit, which includes GSENM. The size of the emergency stabilization and rehabilitation program is proportional to the severity of the wildfire season each year. Due to the low number of wildfires in GSENM, few emergency stabilization and rehabilitation efforts have been used in this area. However, emergency stabilization and rehabilitation will likely be a valuable tool in future management scenarios.

Fire Management Plan

The Color Country Interagency Fire Center dispatches and coordinates wildfire response on BLM-managed, National Forest System, and state lands in the planning area, as well as fires on private lands.

Fire personnel handle fire management responsibilities, such as preparedness, suppression, and extended attack. The center is in Cedar City, Utah.²⁵

The current suppression strategy for the planning area calls for appropriate management response on all wildland fires in accordance with management objectives and based on current conditions and fire location. Every wildland fire is assigned an appropriate management response to protect firefighters, the public, and values at risk, and to minimize suppression costs. Protecting human life is the single overriding priority, with the other priorities being communities, property and improvements, natural and cultural resource values, human health and safety, and suppression costs. The appropriate management response can vary from aggressive initial action to monitoring.

The BLM’s FMP is updated periodically and describes fire and fuels management activities in the decision area. The plan provides for firefighter and public safety and includes fire management strategies, tactics, and alternatives based on direction outlined in the GSENM and KEPA RMP. The plan identifies values to protect, as well as public health issues, describes fuels and restoration projects, and is consistent with resource management objectives. Suppression tactics outlined vary by vegetation type and resource values at risk.

Fire management units are specific land management areas within the fire management plan that are defined by fire management objectives, management constraints, topographic features, access, values to protect, political boundaries, and fuel types. The fire management units were created based on similarities of the specific resource objectives identified in GSENM. The acres of each fire management unit in GSENM are summarized in **Table 3-72** and depicted in **Figure 3-44**, Fire Management Units, in **Appendix A**.

Table 3-72. Fire Management Units in the Decision Area

Fire Management Unit	Acres
Big Deer	516,400
Collett – Fiftymile Mountain	167,700
East Sands	1,000
Escalante – Circle Cliffs	547,400
Glendale Bench	13,000
Kaiparowits	568,400
Paria	20,800
The Blues	30,800

Source: BLM GIS 2022

Trends

Fire is an inherent component of ecosystems and historically has played an important role in promoting plant succession and developing plant community character.

In GSENM, trends in the structure and extent of pinyon-juniper woodlands affect fuel loading and fire regimes in this widespread community. Pinyon-juniper woodlands in GSENM can be characterized as one of two distinct woodland types: 1) persistent woodlands and 2) areas of potential woodland expansion (Romme et al. 2007; Romme et al. 2009). Persistent woodlands are communities in which pinyon and/or

²⁵ Internet website: <https://gacc.nifc.gov/gbcc/dispatch/ut-cdc/about/index.html>.

juniper trees are and have been historically dominant. These types of woodlands are prevalent on the Colorado Plateau.

The fire regime of persistent woodlands includes infrequent burning every 300 to 600 or more years (Romme et al. 2007, 2009; Floyd et al. 2008, *in press*), with fires being typically stand-replacing (high severity), as indicated by absence of fire scars in stands (Baker and Shinneman 2004; Floyd et al. 2008, *in press*). Tree cover in these stands is relatively stable in the absence of contemporary fire. Natural and human-caused climatic variation, including changes in temperature and the timing or amount of precipitation, is probably the major driver of stand dynamics (Romme et al. 2007, 2009; Barger et al. 2009). The structure and extent of persistent woodlands are probably not highly affected by historical or contemporary land uses like livestock grazing or fire suppression.

Wildfire in many of Utah's vegetation communities was historically a regular occurrence that helped define species' composition, structure, and productivity (Bradley et al. 1992; Paysen et al. 2000). Therefore, many plants that comprise these communities are adapted to withstand wildfire. Grasslands, sagebrush, mountain shrub, aspen, and mixed conifer are examples of fire-adapted vegetation communities in the decision area. A study of historical fire regimes in sagebrush landscapes in the western United States found that historical fire intervals were between about 140 and 340 years in sagebrush landscapes, with longer rotations and larger fires occurring in Wyoming big sagebrush (*Artemisia tridentata* ssp. *Wyomingensis*) communities than in mountain big sagebrush (*A. tridentata* ssp. *Vaseyana*) communities (Bukowski and Baker 2013).

In areas of potential woodland expansion into grasslands, sagebrush, mountain shrub, aspen, and mixed conifer, pinyon and/or juniper trees can expand into areas during long disturbance-free intervals or during periods of favorable climatic conditions. Prior to European settlement, periodic fires (fires ignited naturally and by Native Americans) throughout the area that is now GSENM likely maintained a balance of vegetation types and prevented woody fuels from accumulating to hazardous levels. A systematic review of fire history, severity, and role in pinyon-juniper savannas (Baker and Shinneman 2004) found that low-severity fires in juniper savannas prior to European settlement may have killed a high percentage of small trees in savannas and grasslands invaded by small trees, though data on this was generally sparse.

After European settlement but before grazing became regulated with the passage of the Taylor Grazing Act in 1934, the area that is now GSENM was likely overgrazed by cattle and other livestock, reducing fire occurrence (D'Andrea 2015). This likely came about because overgrazing has the potential to reduce fine fuels (grasses and forbs) needed to carry periodic fires. Consequently, livestock grazing may have contributed to pinyon-juniper expansion and infilling.

Controlling fires during the last century has changed plant communities and resulted in conditions that can sustain large-scale fires when vegetation is naturally ignited. As discussed above, fires in the decision area have occurred naturally and been human caused. Fire suppression in recent history may also have contributed to current conditions by removing periodic fire disturbance (D'Andrea 2015).

These conditions have led to vegetation in GSENM that is departed from historical conditions, with fire regimes that are no longer representative of historical conditions. Sixty percent of GSENM is moderately or highly departed (VCC IIA and IIB) from historical fire conditions (see **Table 3-70**) and has less fire now than under historical conditions.

When fires burn in areas of uncharacteristically high fuel loads, they are typically uncharacteristically large or severe. Such catastrophic fires increase the potential for invasive weeds, particularly cheatgrass, to spread. When areas burn in uncharacteristically severe fire native vegetation is destroyed, leaving burned areas susceptible to cheatgrass invasion if seeds are present in the soil or there is a nearby seed source. When conditions are favorable for germination, such as after fires, cheatgrass can outcompete native vegetation (Zouhar 2003). Fine fuels are increased as cheatgrass spreads. Since cheatgrass cures earlier than native vegetation, such sites become more susceptible to reburning. The cheatgrass-fire relationship is thus a positive feedback loop for the continued spread of cheatgrass and more frequent fires (Monsen and Ketchum 1994).

The widespread presence of invasive species (see **Section 3.5**, Noxious Weeds and Invasive, Nonnative Plants) has greatly altered the resource character and values across the landscape and could pose an even greater threat in the future. Historical post-fire recovery processes may no longer dominate the recovery and regeneration process due to introduced species. Cheatgrass and some other types of vegetation are known to alter fire-return intervals and can dramatically expand their ranges after fire. These communities can facilitate expansion of invasive species, have lower biological resource values, and increase fire hazards.

Although a significant number of fires or acres have not burned during the past 10 years, there is potential for more acres to burn. Fire frequency and severity are expected to be higher than historical levels because VCC IIA comprises most of the decision area. Invasion of annual grasses and conifer woodlands into shrub and grasslands and increased live and dead fuel loads within conifer stands are the primary factors for this potential trend. Increasing recreational and back country use in GSENM also is expected to increase the risk of human-caused wildfires.

Forecasts

Wildland fire management options for GSENM typically include appropriate management response; prescribed fire; non-fire fuels treatments, including mechanical, biological, chemical, and biomass removal methods; post-fire rehabilitation and restoration; and community protection and assistance and rural fire assistance. To minimize wildland fire impacts and reduce invasive and noxious weed spread, the BLM Color Country and Paria River Fire and Aviation Management Unit has developed and implemented the emergency stabilization and rehabilitation program. Collectively, the fire management program addresses current VCCs and impacts on other resources. It is expected that, due to the current FRG conditions in the planning area and factors outside the control of the fire program (for example, invasive weed control, vegetation management issues, drought, and livestock grazing), the VCC categories would be maintained at or near their current conditions.

Based on prolonged drought conditions and invasive species establishment, the BLM anticipates that the potential for uncharacteristic wildfire effects will continue under present management in the lower-elevation sagebrush plant communities. It is also anticipated that, under continued management, live and dead fuel loadings in forest stands and conifer and juniper expansion into aspen and higher-elevation sagebrush communities will continue, increasing the risk for wildfires with potentially uncharacteristic fire effects. Management actions to reduce fire severity, including hazardous fuel reductions and emergency stabilization and rehabilitation, could slow resource decline.

3.13.2 Environmental Consequences

Refer to **Section F.18**, Fire and Fuels Management, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would land use allocations and discretionary uses affect fire and fuels?
- How would vegetation management actions affect fire and fuels?

Impacts Common to All Alternatives

Regardless of the alternative, the effects of climate change would likely combine with and exacerbate some effects that result from implementing the alternatives. This, in turn, would affect fire and fuels. The planning area is expected to experience an increase in fire risk as climate trends continue and become more pronounced. Fire frequency is expected to increase as a result of warmer temperatures, higher fuel loading, and longer fire seasons. Fire severity is also expected to increase as a result of more extreme fire weather, dryer fuels and higher fuel loading.

Increased fire frequency and fire size in high-severity fire regimes (primarily FRGs II and V, typically sagebrush and sagebrush communities that have been encroached on by pinyon and juniper trees, and stable pinyon-juniper woodlands) could increase the amount of vegetation-type conversion to communities dominated by invasive annual grasses, lowering ecological resilience from future disturbance.

Because the effects on fire and fuels from weather and changing climate would not vary substantially across alternatives, this is not discussed further.

A full suite of options for fire response (including, but not limited to, hand crews, dozers, and engines), would be available to the BLM under all alternatives. However, differing management prescriptions and allocations under each alternative may dictate how response is carried out in certain areas. For example, fire response in a highly protective land management allocation may require more reliance on hand crews and other nonmotorized response, which may increase response complexity. More detail is provided in the analyses below.

The BLM would manage 559,600 acres of lands with wilderness characteristics, but the management prescriptions would change under each alternative. The number of acres of vegetation in each VCC that would be in each type of management prescription under the alternatives is summarized in **Table 3-73**, VCCs in Lands with Wilderness Characteristics.

In general, managing for more conservative or protective allocations (to protect lands with wilderness characteristics while providing for compatible uses) may reduce the number of human-caused fire ignitions and number of acres burned over time. This would occur because there would be less recreation in these areas, especially motorized recreational activities that are more likely to result in ignitions. When a fire burns in these areas, such protective allocations may make responses more complex or difficult. For instance, response may need to rely more heavily on hand crews, as dozers, engines, or other motorized response may be limited. Conversely, allowing for multiple uses while not protecting lands with wilderness characteristics may increase the number of human-caused ignitions and acres burned in these areas. This prescription may lower response complexity, as a full range of response options would likely be available. Additional analysis is provided under each alternative below.

Table 3-73. Vegetation Condition Classes in Lands with Wilderness Characteristics

Alternative	Vegetation Condition Class	Protect lands with wilderness characteristics while providing for compatible uses (Acres and Percent)	Minimize impacts on wilderness characteristics while emphasizing other uses (Acres and Percent)	Allow for other uses while not protecting lands with wilderness characteristics (Acres and Percent)
A	IA	—	—	41,300 (7)
	IB	—	—	115,600 (21)
	IIA	—	—	260,500 (47)
	IIB	—	—	57,100 (10)
	IIIA	—	—	6,800 (1)
	Other ¹	—	—	78,200 (14)
	Total, Alternative A	—	—	559,400 (100)
B	IA	3,200 (4)	—	38,100 (8)
	IB	8,600 (12)	—	107,100 (22)
	IIA	35,200 (49)	—	225,300 (46)
	IIB	4,800 (7)	—	52,200 (11)
	IIIA	900 (1)	—	5,900 (1)
	Other ¹	19,400 (27)	—	58,700 (12)
	Total, Alternative B	72,000 (100)	—	487,400 (100)
C	IA	7,300 (4)	33,900 (9)	100 (4)
	IB	26,600 (14)	88,400 (24)	600 (23)
	IIA	105,800 (56)	154,100 (42)	700 (27)
	IIB	14,700 (8)	41,900 (11)	400 (15)
	IIIA	3,300 (2)	3,400 (1)	—
	Other ¹	32,300 (17)	45,200 (12)	800 (31)
	Total, Alternative C	190,100 (100)	366,800 (100)	2,600 (100)
D	IA	41,300 (7)	—	—
	IB	115,600 (21)	—	—
	IIA	260,500 (47)	—	—
	IIB	57,100 (10)	—	—
	IIIA	6,800 (1)	—	—
	Other ¹	78,200 (14)	—	—
	Total, Alternative D	559,400 (100)	—	—

Source: BLM GIS 2022

¹ Other includes areas mapped as agriculture, developed, barren or sparse, and water

Continuing to monitor for and control invasive plant species and noxious weeds using an integrated weed management program would slow the establishment and spread of weeds in the planning area. Where control treatments were carried out, woody- and fine-fuel loading would be reduced, lessening the risk for uncharacteristically large, severe fire and movement of the VCC away from historical conditions in burned areas.

As discussed in the *Affected Environment* section, prior to Euroamerican contact, periodic naturally and Native American-ignited fires maintained a mosaic of vegetation types and prevented woody fuels from accumulating to hazardous levels. After Euroamerican contact but before grazing became regulated with

the passage of the Taylor Grazing Act in 1934, the planning area was likely overgrazed by cattle, which reduced fine fuels to the point that fire no longer carried across the landscape. This, among other factors like fire suppression, may have contributed to pinyon-juniper expansion, infilling, woody fuel accumulation, and current departures in VCC and FRG.

Administering livestock grazing to meet the BLM Utah Rangeland Health Standards would continue under all alternatives, though the allocations, including the AUMs and acres available for livestock grazing, would differ under each alternative. Livestock grazing alone would be unlikely to substantially affect the VCC or FRG in the planning area. While grazing may lower fine-fuel loadings due to livestock consumption of annual and perennial grasses and forbs, current VCCs and FRGs in the planning area are primarily driven by the presence or absence of woody fuels, as described above, particularly when they accumulate to hazardous levels. Because livestock grazing allocations would differ under each alternative, the extent to which livestock grazing would be anticipated to lower fine-fuel loadings would also differ under each alternative. However, for the reasons above, livestock grazing is not anticipated to have substantial or varying effects on VCCs and FRGs under the different alternatives, and is therefore not analyzed further in this section.

The number of acres of vegetation in each VCC that would be in each type of ROW allocation under the alternatives is summarized in **Table 3-74**, Vegetation Condition Classes in Right-of-way Allocations. Generally, maintaining existing ROW corridors would result in continued or increased potential for human-caused fire ignitions and potentially the number of acres burned in resulting fires. This would come about for several reasons. First, developing transmission or other linear ROWs involves ground disturbance, which can increase the potential for establishment and spread of invasive plant species. Often, these ROWs include maintenance roads, which can facilitate weed spread across relatively long distances within the corridor, either from natural processes, like wind and water transport of weed seeds, or from weed seeds being transported by maintenance and recreational vehicles that use these roads. The combination of increased vehicle use in these areas and increased cover of fine fuels from invasive plants would also increase the potential for human-caused fire ignitions. The risk would increase with the number of authorized ROWs in the corridor as ground disturbance, weed spread, and vehicle use increases. The potential for these effects may be highest where ROWs are located in areas where vegetation is most departed from historical conditions, as these areas would generally have the highest fuel loads.

On the other hand, properly maintained ROWs may also serve as fuel breaks. Fuel breaks can improve firefighter safety and provide anchor points for fire-suppression activities, expand opportunities to control wildfires, and create buffers for maintaining important habitats (BLM 2020). This may result in fewer acres burned in wildfires. Fuel breaks may also offer greater protection to human life and property and habitat restoration investments and slow the spread of invasive annual grasses that can become dominant after fire, helping to maintain the VCC.

Managing ROW exclusion, avoidance, and open areas under each alternative would also affect the potential for human-caused fire ignitions and acres burned. Generally, in ROW open and avoidance areas, the BLM may authorize linear or site ROWs, which would have effects similar to those described above. In ROW exclusion areas, the BLM would not authorize ROWs except on a site-by-site basis for minimum emergency services. Resulting increases in the potential for human-caused fire ignitions, and acres burned, are not expected in these areas.

Table 3-74. Vegetation Condition Classes in Right-of-way Allocations

Alternative	Vegetation Condition Class	ROW Open (Acres and Percent)	ROW Avoidance (Acres and Percent)	ROW Exclusion (Acres and Percent)
A	IA	45,300 (7)	9,500 (3)	41,500 (5)
	IB	134,500 (21)	42,500 (13)	104,900 (12)
	IIA	288,400 (46)	176,800 (53)	408,000 (46)
	IIB	102,500 (16)	32,900 (10)	62,200 (7)
	IIIA	7,200 (1)	4,700 (1)	11,300 (1)
	Other ¹	52,000 (8)	66,100 (20)	253,100 (29)
	Total, Alternative A	629,900 (100)	332,600 (100)	881,100 (100)
B	IA	2,600 (3)	46,200 (6)	47,500 (5)
	IB	12,900 (15)	151,900 (19)	117,600 (12)
	IIA	35,400 (42)	386,300 (49)	457,700 (47)
	IIB	13,200 (16)	113,800 (15)	71,100 (7)
	IIIA	1,100 (12)	9,200 (1)	13,000 (1)
	Other ¹	19,800 (23)	83,000 (11)	269,400 (28)
	Total, Alternative B	85,000 (100)	790,400 (100)	976,200 (100)
C	IA	<100 (<1)	34,600 (5)	61,700 (5)
	IB	2,600 (24)	115,500 (18)	163,800 (14)
	IIA	2,400 (22)	326,600 (50)	544,900 (45)
	IIB	3,400 (31)	108,100 (16)	86,200 (7)
	IIIA	200 (2)	6,000 (1)	17,000 (1)
	Other ¹	2,200 (20)	55,300 (9)	314,700 (27)
	Total, Alternative C	10,900 (100)	646,200 (100)	1,188,300 (100)
D	IA	<100 (<1)	3,500 (2)	92,800 (5)
	IB	300 (13)	28,500 (19)	253,200 (15)
	IIA	700 (30)	60,600 (40)	812,700 (48)
	IIB	100 (4)	37,300 (25)	160,300 (9)
	IIIA	<100 (<1)	2,400 (2)	20,900 (1)
	Other ¹	1,300 (57)	17,600 (12)	353,200 (21)
	Total, Alternative D	2,300 (100)	150,000 (100)	1,693,100 (100)

Source: BLM GIS 2022

¹ Other includes areas mapped as agriculture, developed, barren or sparse, and water

Providing opportunities to develop solar, wind, and other renewable energy sources would have similar effects as described above for ROW development, because ROW allocations would apply to renewable energy development. However, the scale and magnitude of effects from renewable energy development would be smaller than utility-scale development. This is because utility-scale development would not be allowed in GSENM; rather, renewable energy development would be limited to small-scale energy sources to power GSENM facilities.

The BLM would manage 224.2 miles of suitable river segments under the alternatives, though the river segment classifications would vary slightly between Alternative A and Alternatives B, C, and D (there would

be slightly more miles of wild- and fewer miles of recreational-classified segments under Alternatives B, C, and D). In general, management of wild-classified segments would include restrictions for other types of land use, primarily ROWs. This may reduce the number of ROWs that are proposed or developed in and near WSR segments over time and also reduce the number of human-caused fire ignitions and number of acres burned over time. However, when a fire burns in these areas, such protective allocations may make response more complex or difficult. For instance, response may need to rely more heavily on hand crews, as bulldozers, engines, or other motorized response may be prohibited.

The BLM would manage 881,100 acres of WSAs and ISAs across all alternatives (BLM GIS 2022). Managing WSAs/ISAs would affect fire risk and fuel loads in a similar manner as managing to protect lands with wilderness characteristics and preserve ORVs in wild-classified WSR segments. In summary, the number of human-caused fire ignitions and number of acres burned over time would be reduced in these areas due to less motorized recreation, but fire response may be more complex or difficult due to limitations on available response methods. The potential for these effects may be highest where WSAs/ISAs are located in areas where fuel loading is most departed from historical conditions—in VCCs IIA, IIB, and IIIA. **Table 3-75** summarizes the acres of each VCC that would be managed in WSAs/ISAs. As shown in the table, 46 percent of WSA/ISA areas would encompass vegetation that is moderately departed from historical conditions (VCC IIA), and 8 percent would encompass vegetation that is moderately to highly departed (VCC IIB and IIIA).

Table 3-75. Vegetation Condition Classes in Wilderness Study Areas and Instant Study Areas

Vegetation Condition Class	WSA and ISA (Acres and Percent)
IA	41,600 (5)
IB	105,000 (12)
IIA	407,900 (46)
IIB	62,200 (7)
IIIA	11,300 (1)
Other ¹	253,100 (29)
Total	881,100 (100)

Source: BLM GIS 2022

¹ Other includes areas mapped as agriculture, barren or sparse, and water

Preserving and protecting the integrity, setting, and context of archaeological and historic heritage resources may increase the complexity of appropriate fire response when fires burn in the vicinity of these resources. For example, certain types of suppression response, particularly those that disturb the ground surface, are likely incompatible with preservation guidance for these resources. Guidance is provided by BLM resource advisors and archaeologists involved with the fire response. As a result, incorporating preservation guidance into fire response in these areas may complicate response or preclude certain suppression activities. In some cases, this could result in more acres being burned, but the overall effects would be relatively minor and localized to the site vicinity.

Maintaining and improving the biological integrity and connectivity of terrestrial and aquatic wildlife habitats and populations, including special status species, would incidentally maintain, and in some cases improve, fuel loading conditions, vegetation community climate resiliency, and fire response. This would happen because in most cases wildlife and special status species habitat-improvement projects would move vegetation conditions toward desired conditions; often, this would include reducing uncharacteristic fuel

loading to improve habitat resilience, such as in sagebrush communities that have been encroached by pinyon and juniper trees.

Where possible, the BLM could allow natural-caused wildland fire to function in its natural ecological role to protect, maintain, and enhance resources. As described in the *Affected Environment, Trends*, numerous fire-adapted vegetation communities are in the decision area, including grasslands, sagebrush, mountain shrub, aspen, and mixed conifer forests. Where allowed to burn in these communities, fire would be expected to reduce excess woody and fine fuels, stimulate growth of fire-adapted vegetation, and help maintain ecological conditions and functions. This would help maintain the VCC and FRG at or close to historical conditions. Due to hazardous fuel loads in some areas, allowing a naturally ignited fire to burn for resource benefits may not be appropriate without mechanical pre-treatment to reduce fuels. This may be the case in sagebrush communities that have been encroached on by pinyon and juniper trees or in areas that have been invaded by invasive annual grasses.

Post-fire rehabilitation activities are evaluated on a case-by-case basis. Evaluation considers the structure and diversity of vegetation before fire, the presence of noxious weeds in the area, and the likelihood that noxious weeds would increase as a result of fire. Using native species for post-fire seeding is a GSENM priority, but nonnative species may be used for post-fire soil stabilization or seeding if the area is threatened by species with high invasive potential. Carrying out emergency stabilization and rehabilitation after wildland fire may lower the potential that burned areas would become dominated by invasive annual grasses, though success or failure of restoration likely depends on multiple site variables, including soil moisture and nutrient content, pre-fire native and invasive plant cover, and biological soil crust presence (Evangelista et al. 2004). Where rehabilitation effects are successful, maintenance of native plant richness and cover would help maintain the VCC and FRG of burned areas.

Emergency stabilization and rehabilitation effectiveness may also be influenced by using complimentary treatments to enhance seeding success. Juran and others (2008) examined chained and unchained post-fire seedings in the Henry Mountains in southeastern Utah on BLM-managed lands dominated by pinyon juniper woodlands prior to burning. They found that aerial seeding was successful with and without chaining but concluded this finding may be due to the relatively high elevation of the study site and relatively high amounts of post-seeding precipitation. The authors state that seed burial and microtopographic depressions resulting from chaining should increase available water for seeds and enhance germination and seedling survival under marginal precipitation (Juran et al. 2008).

The BLM would carry out management to maintain or improve forest and woodland health and reduce the potential for catastrophic wildfire under all alternatives. Where management is carried out, VCC and FRG would be maintained or moved toward historical conditions. When fires ignited or burned into these areas, such conditions may facilitate response efficiency.

Providing recreational opportunities to meet recreational demands, which are expected to continue to increase over time, would increase the potential for human-caused ignitions and acres burned in resulting fires. This would happen because certain forms of recreation, including motorized recreational activities and campfires, increase the likelihood of human-caused ignitions. Campfire use recommendations, such as having campfires in fire grates or on fire pans or blankets and removing ash, could reduce, but would not remove, the potential for human-caused ignitions from campfires. As such, there would be an increased need to implement fuels-reduction treatments in popular recreation areas to protect life, property, and

other values at risk from the effects of uncharacteristically large and severe fire, should one be ignited in these areas.

These effects would be concentrated in RMAs as recreational use would be concentrated in these areas. RMAs with vegetation conditions that are most departed from historical conditions may have the greatest potential to be affected. The acres of VCCs in ERMAs and SRMAs that would be managed under each alternative are summarized in **Table 3-76**, Vegetation Condition Classes in Recreation management Areas.

Similarly, allowing OHV use on designated GSENM routes—especially those that traverse areas with departed vegetation conditions—would increase the potential for human-caused ignitions and increase the potential for number of acres burned in resulting fires.

Table 3-76. Vegetation Condition Classes in Recreation Management Areas

Alternative	Vegetation Condition Class	ERMAs (Acres and Percent)	SRMAs (Acres and Percent)
A	IA	91,000 (5)	5,300 (8)
	IB	262,300 (15)	20,500 (30)
	IIA	876,300 (49)	14,900 (22)
	IIB	191,400 (11)	7,200 (11)
	IIIA	21,800 (1)	1,500 (2)
	Other ¹	354,200 (20)	18,200 (27)
	Total, Alternative A	1,797,100 (100)	67,500 (100)
B	IA	95,200 (5)	1,100 (1)
	IB	267,300 (15)	15,200 (16)
	IIA	867,400 (49)	24,400 (25)
	IIB	194,400 (11)	4,400 (5)
	IIIA	22,100 (1)	1,200 (1)
	Other ¹	323,000 (18)	48,900 (51)
	Total, Alternative B	1,769,400 (100)	95,200 (100)
C	IA	32,400 (7)	8,200 (2)
	IB	73,300 (15)	60,900 (15)
	IIA	223,800 (46)	148,400 (35)
	IIB	88,700 (18)	20,600 (5)
	IIIA	4,600 (1)	4,300 (1)
	Other ¹	63,500 (13)	174,900 (42)
	Total, Alternative C	486,200 (100)	417,200 (100)
D	IA	2,600 (1)	5,400 (3)
	IB	28,400 (11)	29,800 (18)
	IIA	109,100 (44)	38,100 (24)
	IIB	13,500 (5)	6,600 (4)
	IIIA	3,000 (1)	1,200 (1)
	Other ¹	94,500 (38)	79,700 (50)
	Total, Alternative D	251,100 (100)	161,000 (100)

Source: BLM GIS 2022

¹ Other includes areas mapped as agriculture, developed, barren or sparse, and water

Alternative A

The number of acres of VCCs that would be in each type of lands with wilderness characteristics management prescription under the alternatives, including Alternative A, is summarized in **Table 3-73**,

Vegetation Condition Classes in Lands with Wilderness Characteristics. Under Alternative A, managing lands with wilderness characteristics for multiple uses without applying provisions to specifically protect wilderness characteristics may increase the potential that VCC in these areas may move away from historical conditions or become more departed. This would happen because the potential for fires would likely be higher, as discussed under *Impacts Common to All Alternatives*. The potential for these effects may be highest where vegetation is most departed from historical conditions, as these areas would provide potentially hazardous levels of fuels, would be at greatest risk of burning with uncharacteristic severity, and would have the greatest potential to become further departed after fire. As shown in **Table 3-73**, about 57 percent of acres of lands with wilderness characteristics would encompass vegetation that is moderately departed from historical conditions (VCC IIA) or moderately to highly departed (VCC IIB).

Continuing to protect, enhance, and restore vegetation communities in accordance with ecological site potential would help maintain vegetation community ecological processes and functions where management is carried out. In these areas, the VCC could initially move toward historical conditions – that is, the amount of departure from historical conditions would decrease in these areas. However, as climate and fire trends become more pronounced, it is likely that the resilience of treated vegetation communities would decrease unless specific consideration is given to increasing climate resiliency. Areas with decreased resiliency would be at heightened risk for uncharacteristically large, severe fire, likely increasing the acres burned over time. In burned areas, increased potential for invasive annual grass establishment would move the VCC further from historical conditions.

The number of acres of VCCs that would be in each type of ROW allocation under the alternatives is summarized in **Table 3-74**, Vegetation Condition Classes in Rights-of-way Allocations. Under Alternative A, 629,900 acres would be managed as open to ROWs; 63 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions, increasing the potential for human-caused fire and affecting the acres burned in wildfires, for the reasons described in *Impacts Common to All Alternatives*. Approximately 881,100 acres would be managed as ROW exclusions; 54 percent of these acres would be in VCCs that are moderately or highly departed.

Maintaining current limitations on post-fire restoration, weed treatments, seedings, and prescribed fire within and near special status species habitat may slow the pace and scale of treatments that the BLM can employ. As a result, burned habitat areas may move away from historical conditions, especially if invasive annual grasses were present in the area before the fire. In this case, invasive annual grasses would be more likely to regenerate in burned areas and outcompete native vegetation, changing the fire regime to one with more frequent fires facilitated by continuous fine fuels.

Commercial harvest would continue to be a tool used for forest health treatments across GSENM. Allowing commercial harvest may result in more acres being treated over time, as treatments would carry economic incentive. As described under *Impacts Common to All Alternatives*, where treatments were carried out, VCC and FRG would be maintained or moved toward historical conditions. When fires ignited or burned into these areas, such conditions may facilitate response efficiency. While commercial harvest would continue to be allowed in GSENM, in practice, such treatments are unlikely to be carried out in WSAs due to potential incompatibilities with wilderness values.

The number of acres of VCCs that would be in ERMA and SRMA is summarized in **Table 3-76**, Vegetation Condition Classes in Recreation Management Areas. About 1,797,100 acres would be managed in ERMA; 61 percent of these acres would encompass VCCs that are moderately to highly departed from

historical conditions, increasing the potential for human-caused fire and acres burned, for the reasons described under *Impacts Common to All Alternatives*. About 67,500 acres would be managed in SRMAs; 35 percent of these acres would be in VCCs that are moderately or highly departed.

Alternative B

The number of acres of VCCs that would be in each type of management prescription for lands with wilderness characteristics under the alternatives is summarized in **Table 3-73**, *Vegetation Condition Classes in Lands with Wilderness Characteristics*. Under Alternative B, managing 72,000 acres to protect lands with wilderness characteristics (including 35,200 acres or 49 percent of which would be in VCCs that are moderately departed from historical conditions) may reduce the number of human-caused fires and acres burned in these areas compared with Alternative A. When fires did occur, response may be more complex than under Alternative A. This prescription would apply for lands with wilderness characteristics that are wholly surrounded by WSAs.

The effects from managing lands with wilderness characteristics for multiple uses and not applying provisions specifically to protect wilderness characteristics would be as described under Alternative A. While fewer acres would fall under this allocation than under Alternative A, the same proportion of those acres (57 percent) would be in VCCs that are moderately departed from historical conditions (VCC IIA) or moderately to highly departed (VCC IIB).

Proactive vegetation management to protect and restore ecological processes and increase vegetation community climate resiliency would help maintain the extent and function of vegetation communities in the longer term as climate trends become more pronounced. Vegetation management is likely to be focused in areas where the VCC is the most departed from historical conditions, for instance, in historical sagebrush communities that have been encroached on by pinyon and juniper trees, and in historical woodlands where infill by pinyon and juniper trees has occurred. As a result, the VCC would likely move toward historical conditions in more areas than under Alternative A. This would occur because treatments would address the risk of uncharacteristically large, severe fire by reducing woody fuel loads. As a result, the acres burned over time would decrease relative to Alternative A, leading to less potential for invasive annual grass establishment.

Proactive vegetation management, as described above, would result in VCCs more typical of conditions prior to Euroamerican contact; conditions that would experience more frequent, low-severity fire. When ignitions occur in treated areas, or fires burn into treated areas, these fires would be expected to provide fewer challenges for response. As a result, there would be a higher likelihood that such fires could be more effectively and efficiently managed, compared with Alternative A.

The number of acres of VCCs that would be in each type of ROW allocation under the alternatives is summarized in **Table 3-74**, *Vegetation Condition Classes in Rights-of-way Allocations*. Approximately 85,000 acres (86 percent fewer acres than under Alternative A) would be managed as open to ROWs; 70 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas would therefore be lower than under Alternative A. The opportunities to use ROWs as fuel breaks during fire response would also be lower.

Approximately 976,200 acres would be managed as ROW exclusion; 55 percent of these acres would be in VCCs that are moderately or highly departed from historical conditions. This is similar to the amount of ROW exclusion under Alternative A, so the potential for human-caused fires to start in these areas, and the potential for ROWs to be used as fuel breaks, also would be similar to Alternative A.

The pace and scale of post-fire restoration, weed treatments, seedings, and prescribed fire within and near special status species habitat would likely increase compared with Alternative A. This is because the current limitations on these activities would not apply; instead, treatments could be implemented as long as appropriate mitigation measures could protect special status species during treatments. As a result, fewer burned habitat areas would move away from historical conditions in terms of fuel loading and fire regime.

The effects from carrying out landscape-scale ecosystem restoration projects to restore functional vegetative communities would be as described above for management to increase the vegetation function. In summary, in treated areas the VCC would likely move toward historical conditions because treatments would address the risk of uncharacteristically large, severe fire by reducing woody fuel loads. In turn, the acres burned over time would be expected to decrease relative to Alternative A, and when ignitions occur in treated areas or fires burn into treated areas, these fires would be expected to provide fewer challenges for response.

Rehabilitating and restoring landscapes after wildland fire would be done according to site management goals; goals would vary generally based on ecosystem function and if ecosystems are at risk of losing ecosystem components or are functioning within their historical range. Adapting rehabilitation and restoration goals based on site function would help maintain or restore the VCC and FRG in burned areas.

Prioritizing wildland fire to protect, maintain, and enhance resources and to function in its natural ecological role would have similar effects as described under *Impacts Common to All Alternatives*. However, under Alternative B, additional administrative guidance would be in place to identify what fires could be allowed to burn, and where such management would be appropriate. Adding this decision making process may result in the BLM allowing fewer wildland fires to burn for resource benefit; however, when wildland fires are allowed to burn, they would likely result in more effective movement toward desired conditions. This is because the decision making process would identify the most appropriate areas for such management, including areas where fuels have not accumulated to hazardous levels. Like Alternative A, only natural-caused fires would be allowed to potentially burn for resource benefit.

Noncommercial harvest of forestry and woodland products would be used to maintain watershed values, support wildlife habitat, and reduce the potential for catastrophic wildfires. Noncommercial harvest would be prohibited in WSAs; lands with wilderness characteristics managed for protection; ponderosa pine, Douglas-fir, mixed conifer, and aspen stands; and other sensitive areas. As such, the potential for catastrophic wildfire would not be reduced through noncommercial forest and woodland product harvest in these areas. Given Alternative B's emphasis on proactive vegetation management, it is likely that more acres would be treated over time, compared with Alternative A, despite prohibiting commercial harvest of forest and woodland products. As described under *Impacts Common to All Alternatives*, where noncommercial harvests were carried out, the VCC and FRG would be maintained or moved toward historical conditions. When fires ignited or burned into these areas, such conditions may facilitate response efficiency.

The number of acres of VCCs that would be in ERMA and SRMA under the alternatives is summarized in **Table 3-76**, Vegetation Condition Classes in Recreation Management Areas. Approximately 1,769,400 acres (nearly the same as under Alternative A) would be managed as ERMA; 61 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas and the potential for acres burned would therefore be about the same as under Alternative A.

Approximately 95,200 acres (30 percent more acres than under Alternative A) would be managed as SRMA; 31 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas and the potential for acres burned would therefore be greater than under Alternative A.

Alternative C

The number of acres of VCCs that would be in each type of management prescription for lands with wilderness characteristics under the alternatives is summarized in **Table 3-73**, Vegetation Condition Classes in Lands with Wilderness Characteristics. Managing 366,800 acres to minimize impacts on lands with wilderness characteristics while emphasizing other multiple uses would likely have similar effects to those described under Alternative A. This is because other multiple uses would still be emphasized in these areas and, as a result, recreation trends and increased potential for human-caused fire ignitions would still occur in these areas. Approximately 53 percent of acres in this allocation would be in VCCs that are moderately departed from historical conditions (VCC IIA) or moderately to highly departed (VCC IIB).

The number of acres of VCCs that would be in each type of ROW allocation under the alternatives is summarized in **Table 3-74**, Vegetation Condition Classes in Rights-of-way Allocations. Approximately 10,900 acres (98 percent less than under Alternative A) would be managed as open to ROWs; 55 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas would therefore be lower than under Alternative A, as would the potential that ROWs could serve as fuel breaks during fire response.

Approximately 1,188,300 acres (35 percent more than under Alternative A) would be managed as ROW exclusion; 53 percent of these acres would be in VCCs that are moderately or highly departed from historical conditions. The potential for human-caused fires to start in these areas would be lower than under Alternative A, as would the potential that ROWs in these areas could serve as fuel breaks during fire response.

Noncommercial harvest of forestry and woodland products would be used to maintain watershed values, support wildlife habitat, and reduce the potential for catastrophic wildfires. Like under Alternative B, noncommercial harvest would be prohibited in WSAs; lands with wilderness characteristics managed for protection; ponderosa pine, Douglas-fir, mixed conifer, and aspen stands; and other sensitive areas. As such, the potential for catastrophic wildfire would not be reduced through noncommercial forest and woodland product harvest in these areas. Given Alternative C's emphasis on using natural processes for vegetation management in the primitive area, it is likely that fewer acres would be treated over time compared with Alternative A. As a result, the VCC and FRG would move further from historical conditions.

Prioritizing wildland fire to protect, maintain, and enhance resources and to function in its natural ecological role would have the same effects as described under Alternative B.

The number of acres of VCCs that would be in ERMA and SRMA under the alternatives is summarized in **Table 3-76**, Vegetation Condition Classes in Recreation Management Areas. Approximately 486,200 acres (73 percent fewer acres than under Alternative A) would be managed as ERMA; 65 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas and the potential for acres burned would therefore be less than under Alternative A.

Approximately 417,200 acres (6 times more acres than under Alternative A) would be managed as SRMA; 41 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas and the potential for acres burned would therefore be greater than under Alternative A.

Managing recreational areas under Alternative C may similarly concentrate recreational use, including motorized use and overnight camping, into areas that provide facilities catering to these uses. This may also concentrate the potential for human-caused ignitions and acres burned in resulting fires in these areas. This would likely primarily include the front and passage areas, which would provide the greatest number of developed facilities. Potential effects in the outback area would be limited to designated roads and routes. The potential for these effects would be lowest in the primitive area, as motorized use and developed facilities would not be present.

The effects from fish and wildlife, special status species, and fire and fuels management would be the same as those described under Alternative B.

Alternative D

The number of acres of VCCs that would be in each type of management prescription for lands with wilderness characteristics under all alternatives is summarized in **Table 3-73**, Vegetation Condition Classes in Lands with Wilderness Characteristics. Managing all lands with wilderness characteristics to protect wilderness character would reduce the potential for human-caused fire ignitions and acres burned in these areas compared with Alternative A. However, as discussed above, fire response would be more complex and potentially less efficient.

Management to protect and restore native functional vegetation communities and improve habitat for wildlife and special status species would be carried out, but management would prioritize natural processes and techniques. This means that management methods such as chaining and mechanical, chemical, and woodland product removal would be deemphasized in favor of prescribed fire and biological management methods. As a result, it is likely that fewer acres of management would be done. This is because there are uncharacteristic fuel loadings in many areas of GSENM, and prescribed fire would not be appropriate in these areas without mechanical pre-treatments to remove fuels. Similarly, biological management methods may weaken, defoliate, or otherwise kill target vegetation, but would leave residual woody or fine fuels on the landscape, resulting in managed areas that would also not be appropriate for prescribed fire application. Carrying out fewer acres of management would mean more areas would remain at increased risk for uncharacteristically large, severe fire, and more areas would remain in a VCC that is departed from historical conditions.

Monitoring for and controlling invasive plant species and noxious weeds would have similar effects on fuel loading and VCC as described under *Impacts Common to All Alternatives*. However, giving priority to natural processes for weed control may reduce management effectiveness or slow movement toward desired conditions. As a result, fuel loading reductions and movement of the VCC toward desired conditions may not be as pronounced as under other alternatives that would allow a full suite of management methods.

The number of acres of VCCs that would be in each type of ROW allocation under the alternatives is summarized in **Table 3-74**, Vegetation Condition Classes in Rights-of-way Allocations. Approximately 2,300 acres (a fraction of a percent of the acres under Alternative A) would be managed as open to ROWs; 34 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas would therefore be lower than under Alternative A, as would the potential for ROWs in these areas to serve as fuel breaks during fire response.

Approximately 1,693,100 acres (48 percent more than under Alternative A) would be managed as ROW exclusion; 57 percent of these acres would be in VCCs that are moderately or highly departed from historical conditions. The potential for human-caused fires to start in these areas would be lower than under Alternative A, as would the potential for ROWs in these areas to serve as fuel breaks during fire response.

Prioritizing wildland fire to protect, maintain, and enhance resources and to function in its natural ecological role would have the same effects as described under Alternative B.

The effects on fire and fuels management from carrying out emergency stabilization and restoration would be similar to the effects described under in the *Impacts Common to All Alternatives* section. The effects on fire and fuels from carrying out landscape-scale ecosystem restoration projects to restore functional vegetative communities would be similar to the effects described under Alternative B. However, since Alternative D would prioritize natural processes and techniques, fewer acres of treatments would likely be done. The reasoning for this is explained above. In summary, natural processes and techniques are not appropriate for use in some areas of GSENM due to uncharacteristically high fuel loads. Carrying out fewer acres of treatments would mean more areas would remain at increased risk for uncharacteristically large, severe fire, and more areas would remain in a VCC that is departed from historical conditions. Further, in burned areas there would likely be more acres that move toward a FRG favoring higher frequency fire as invasive annual grasses become dominant in these areas.

The effects on fire and fuels management from forestry and woodland products management would be the same as described under Alternative C.

The number of acres of VCCs that would be in ERMA and SRMA under the alternatives is summarized in **Table 3-76**, Vegetation Condition Classes in Recreation Management Areas. Approximately 251,100 acres (86 percent fewer acres than under Alternative A) would be managed as ERMA; 49 percent of these acres would encompass VCCs that are moderately to highly departed from historical conditions. The potential for human-caused fires to start in these areas and the potential for acres burned would therefore be lower than under Alternative A.

Approximately 161,000 acres (2.4 times more acres than under Alternative A) would be managed as SRMA; 28 percent of these acres would encompass VCCs that are moderately to highly departed from

historical conditions. The potential for human-caused fires to start in these areas and the potential for acres burned would therefore be greater than under Alternative A.

Cumulative Impacts

The BLM, Forest Service, NPS, and adjacent state, tribal, county, and privately owned lands surrounding GSENM are considered to be the cumulative effects analysis area for fire and fuels management. Ongoing and planned actions in and near GSENM would influence fire and fuels management effectiveness on a regional scale. The time frame for cumulative environmental consequences for future actions is 15 years.

Portions of GSENM adjoin other BLM-managed lands, National Forest System lands, national parks, and national recreation areas, each having its own land management plan guiding vegetation and fuels management in the administrative area. Fire and fuels management is becoming more broadly consistent across federal land ownerships due to updated plan adherence with current federal law, regulation, and policy. Fire and fuels direction in the adjacent agency land management plans are complementary to the proposed plan components for GSENM. This means broad movement toward desired conditions for vegetation condition, fuel loading, and fire response would be facilitated across administrative boundaries in this region.

The cumulative impacts of past and present actions on fire and fuels management in the planning area are captured in the description of the affected environment (**Section 3.13.1**). Primarily this includes pre-Euroamerican contact frequent, lower-intensity fire, followed by post-Euroamerican contact livestock grazing and fire suppression, including policies established in the early 1900s and carried forward in other forest and land management plans and other state and local policies throughout the broader landscape, which have resulted in current hazardous fuel loading and VCC and fire regimes that are departed from historical conditions. This has resulted in a landscape with more flammable woody and fine vegetation and a greater potential for uncharacteristically large, severe fires compared with historical conditions. Ongoing climate trends, including more frequent extreme fire weather, combine with and exacerbate these conditions.

The importance of fuels treatments and wildland fire management is widely recognized by state and federal agencies, adjacent landowners, and the general public. Actions taken outside GSENM include federal and state-funded hazardous fuel reduction projects on National Forest System and BLM-managed lands that generally aim to move vegetation conditions and fuel loading toward historical conditions and restore historical FRGs. Continuation of management prescribed in the BLM's KEPA 2020 ROD would allow for activities that increase the risk of wildfires (such as recreation) and vegetation management projects that would reduce fuel loading. The KFO Noxious and Invasive Vegetation Management Environmental Assessment would continue to guide weed management on lands bordering GSENM and would, therefore, have the potential to reduce weeds encroaching onto GSENM. Other vegetation management projects in the cumulative effects analysis area include the Upper Kanab Creek Watershed Environmental Assessment. There are also additional renewable energy and other ROW projects in the cumulative effects analysis area, including industrial-scale solar energy development on State of Utah School and Institutional Trust Lands Administration lands near Big Water. Other relevant activities include recreational activities such as camping/campfire use, OHV use, and continued livestock grazing that could affect the extent of fine fuels such as invasive annual grasses.

Also, nonfederal land management policies are likely to continue affecting fire and fuels management around GSENM. The cumulative effects across the large, geographically complex, and diverse cumulative analysis area are difficult to analyze, considering the uncertainties associated with government and private actions and ongoing changes to the region's economy. However, based on the trends identified in this section, cumulative effects, including increases in recreation, continued establishment and spread of weeds, continued encroachment of pinyon and juniper into sagebrush communities, ongoing livestock grazing, and expansion of the wildland-urban interface, including housing and commercial development, are likely to continue or increase.

Reasonably foreseeable future actions in GSENM have the potential to impact fire and fuels management; these are generally projects that would substantially alter fuel loading or VCC or projects for which there is a risk of human-caused fire. Projects that are anticipated to alter fuel loading include the Skutumpah Terrace Greater Sage-grouse Habitat Restoration Projects. Projects that may increase the potential for human-caused fire ignitions are ROW development projects including the Newer Garkane Transmission ROW (Buckskin to Fredonia Powerline), the Garkane Transmission ROW, and the Lake Powell Pipeline ROW. These projects, which also involve surface disturbance, may facilitate invasive plant establishment and spread, increasing fuel loading along the ROW corridor.

Proposed wildland fire management activities under Alternatives B, C, and D would contribute to the cumulative effects of regional fire and fuels management by other agencies and stakeholders. These efforts would contribute to landscape restoration and ecological resilience on a larger scale, with a focus on achieving desired vegetation conditions, restoring more natural FRGs, and reducing the potential for uncharacteristically large and severe fires. Alternatives B and C, which prioritize active management with a full range of treatment options, could have greater contributions toward these effects than Alternative D, which emphasizes passive management and more limited treatment options.

3.13.3 References

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3.14 LANDS WITH WILDERNESS CHARACTERISTICS

Congress has given the BLM broad authority to identify lands with wilderness characteristics and, if appropriate, to manage lands to protect such characteristics. Lands with wilderness character are considered based on factors identified in BLM Manual 6320. Factors include manageability, resource values and uses, and congressional release of WSAs. Under FLPMA Section 201 and later per guidance outlined in BLM Manual 6310 (BLM 2021a), the BLM began updating findings for lands with wilderness characteristics in 1996 and completed findings in early 1999 (BLM 1999). This inventory was updated in 2020 and 2023 to further identify which GSENM lands contain wilderness characteristics.

3.14.1 Affected Environment

Current Conditions

There are 559,600 acres outside of existing WSAs that the BLM has determined through inventory to possess wilderness characteristics (see **Table 3-77** and **Figure 2-6, Appendix A**). The 2020 KEPA Approved RMP directed the BLM to not manage any lands within the former GSENM for the protection, preservation, or maintenance of wilderness characteristics; however, lands previously identified as having wilderness characteristics may have retained those characteristics, and their management may be re-evaluated during this planning process.

Table 3-77. Lands with Wilderness Characteristics

Unit Name	Acres with Wilderness Characteristics*
Box Canyon	2,900
Burning Hills	16,200
Burning Hills C	700
Carcass Canyon	34,800
Carcass Canyon A	600
Carcass Canyon B	200
Cave Point	5,200
Colt Mesa	28,300
Death Ridge	3,800
Death Ridge A	100
Death Ridge B	200
Fiftymile Mountain	56,800
Fiftymile Mountain A	90
Fiftymile Mountain B	900
Horse Mountain	21,300
Horse Spring Canyon	31,500
Hurricane Wash	9,000

3. Affected Environment and Environmental Consequences (Lands with Wilderness Characteristics)

Unit Name	Acres with Wilderness Characteristics*
Lamp Stand	3,500
Little Egypt	22,400
Mud Spring Canyon	24,100
Mud Spring Canyon W	40
Muley Twist Flank	2,200
N Escalante Canyons/Gulch	7,000
N Escalante Canyons	26,100
Nipple Bench	27,700
Nipple Bench Area	3,400
Paria Canyon A	100
Paria Canyon B	80
Paria Canyon C	2,400
Paria Canyon D	100
Paria-Hackberry	50,300
Phipps-Death Hollow	7,100
Pioneer Mesa	11,200
Scorpion	14,900
Squaw Canyon	14,800
Steep Creek	11,700
Studhorse Peaks	24,800
Sunset Arch	5,500
The Blues	2,300
The Blues B	200
The Blues C	600
The Cockscomb	1,500
The Cockscomb A	100
The Cockscomb C	10
The Cockscomb D	70
Upper Kanab Creek	5,100
Upper Kanab Creek B	100
Wahweap	10,300
Wahweap A	500
Wahweap B	300
Wahweap-Death Ridge	42,200
Warm Creek	24,200
Total	559,600

Source: BLM GIS 2022

*Acres are rounded to the nearest 100, or to the nearest 10 if less than 100.

Trends

Recreational use is increasing throughout GSENM and will likely alter the landscape over time through increased human presence, OHV use, dispersed camping, and hiking in certain areas. This can lead to increased disturbances, such as crowding, noise, route widening, and campsite expansion. With these alterations, comes a need for reoccurring updated inventories of lands with wilderness characteristics to evaluate if the wilderness characteristics are still present.

Forecasts

Although there is no designated wilderness in GSENM, interest in resources with similarities to wilderness or potential for eventual designation as wilderness has garnered attention. Public interest in the BLM's

lands with wilderness characteristics inventory determinations, as well as management actions for these areas, has increased dramatically in the past 20 years, and is expected to continue increasing. Should areas that currently meet the definition of lands with wilderness characteristics found in BLM Manuals 6310 and 6320 (BLM 2021a and b, respectively) become negatively impacted, the BLM may have to determine allocations of use to preserve wilderness characteristics. Conflicts between development interests and preservation interests are expected to increase into the future.

3.14.2 Environmental Consequences

Refer to **Section F.19**, Lands with Wilderness Characteristics, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management affect the size; apparent naturalness; outstanding opportunities for solitude or primitive, unconfined recreation; and supplemental values of lands with wilderness characteristics?

Impacts Common to All Alternatives

All lands with wilderness characteristics would continue being managed in accordance with BLM Manual 6320 to protect wilderness characteristics while providing for compatible uses, minimize impacts on wilderness characteristics via management restrictions, or allow for other compatible uses in an area while not protecting wilderness characteristics (BLM 2021b).

Under all alternatives, adjustments made to administer livestock grazing could impact lands with wilderness characteristics. Livestock management including infrastructure, as well as direct impacts from livestock, can restrict unconfined recreation and/or decrease apparent naturalness.

Alternative A

Within the decision area, there are 559,600 acres of lands with wilderness characteristics that would continue to be managed to allow for other uses, providing minimal protection to wilderness characteristics.

Of the 559,600 acres of lands with wilderness characteristics, 344,700 acres (62 percent) would continue to be managed as open to ROW authorization, 214,400 acres (38 percent) would continue to be managed as a ROW avoidance areas, and 400 acres (less than 1 percent) would continue to be managed as a ROW exclusion areas. Land use authorization may lead to surface disturbance and a loss of apparent naturalness, outstanding opportunities for solitude or primitive and unconfined types of recreation, and supplemental values, where present. Further, linear features have the potential to act as boundaries for lands with wilderness characteristics units. If a linear feature were to bisect a unit, depending on its current size, it could reduce the area so that it no longer meets the size criteria. Developed ROWs are listed in the BLM Manual 6310 as a boundary for lands with wilderness characteristics units (BLM 2021a). Authorizing ROWs could impact lands with wilderness characteristics by reducing the acreage of a lands with wilderness characteristics unit. With the development of ROWs, like transmission lines, there is an impact on the surface of the land to create these features. This could contribute to a loss of apparent naturalness of the lands with wilderness characteristics.

The 559,600 acres of lands with wilderness characteristics would continue to be limited to existing and designated routes for OHV use. Limiting visitors to existing and designated routes would allow for more opportunities for solitude or primitive and unconfined recreation and decrease new disturbances that they may cause.

Under this alternative, lands with wilderness characteristics would continue to be managed as follows: VRM Class I (300 acres; less than 1 percent), VRM Class II (227,000 acres; 41 percent), VRM Class III (203,200 acres; 36 percent), and VRM Class IV (128,800 acres; 23 percent). VRM Class III and VRM Class IV objectives could impact lands with wilderness characteristics because these objectives allow for moderate and high levels of change to the landscape and allow for management activities to attract attention. Lands with wilderness characteristics are less likely to be impacted in VRM Class I and VRM Class II areas where the level of change permitted to the characteristic of the landscape is only permitted for natural ecological changes, or if the change is low.

Under this alternative, a full range of vegetation management methods would continue to be permitted. Vegetation management may provide short-term impacts on lands with wilderness characteristics depending on the treatment type. For example, chaining or mastication could cause a temporary reduction in solitude, with increased presence and noise. Mechanical vegetation removal also temporarily impacts apparent naturalness by creating abnormal concentrations of dead vegetation and fuel loading. Vegetation management and restoration over time would improve vegetation structure, function, and condition, thereby protecting or enhancing the wilderness values, particularly apparent naturalness.

Alternative B

Of the 559,600 acres of lands with wilderness characteristics, 72,000 acres would be managed to protect those characteristics while also providing for compatible uses under this alternative. The remaining 487,600 acres of lands with wilderness characteristics would be managed for other compatible uses while not protecting wilderness characteristics. Depending on management, activities in the areas managed for other compatible uses may degrade the values and qualities of wilderness characteristics. Compared with Alternative A, there would be 72,000 more acres of protected lands with wilderness characteristics. This would preserve more areas with natural conditions, outstanding opportunities for solitude or primitive and unconfined recreation, and supplemental values.

Under Alternative B, the 72,000-acres managed to protect the lands with wilderness characteristics would be managed as a ROW exclusion area, thereby restricting all ROW development on these lands. Of the remaining lands with wilderness characteristics managed for other compatible uses, 11,800 acres would be open to ROW authorization, 445,800 acres would be managed as a ROW avoidance area, and 30,100 acres would be managed as a ROW exclusion area, but without additional protections for the lands with wilderness characteristics. Compared with Alternative A, lands with wilderness characteristics would be more protected from ROW disturbances under this alternative because majority of the lands with wilderness characteristics would be managed as a ROW exclusion or avoidance area. As a result, this would protect more lands with wilderness characteristics from the development of ROWs that could impact the size of the lands with wilderness characteristics units. This would also protect the lands with wilderness characteristics from surface disturbances that could impact the apparent naturalness, opportunities for primitive and unconfined recreation, and supplemental values.

Under Alternative B, the 72,000 acres of protected lands with wilderness characteristics would be closed to OHV use, thereby preventing potential damage from this use. The remaining lands with wilderness characteristics that would be managed for other compatible uses would have 200 acres closed to OHV use, but the majority of the lands (487,400 acres) would be limited to existing and designated routes. Compared with Alternative A, lands with wilderness characteristics would be more protected from OHV use under this alternative because more acres would be closed to OHV use. This would increase the opportunities for solitude by restricting the sight and sound of vehicle use and other people. A decrease in motorized access on some lands with wilderness characteristics units could reduce opportunities for primitive nonmotorized recreation in adjacent areas by making remote trailheads less accessible during the hot and dry seasons. Reduced OHV use improves apparent naturalness by preventing user-created route proliferation, route widening or braiding, and dispersed camping impacts.

Under Alternative B, the 72,000-acres managed to protect lands with wilderness characteristics would be managed as a VRM Class I. The remaining lands with wilderness characteristics that would be managed for other compatible uses would be as follows: 2,000 acres managed as VRM Class I, 284,700 acres managed as VRM Class II, and 200,900 acres managed as VRM Class III. Compared with Alternative A, lands with wilderness characteristics would be more protected by VRM under this alternative because more acres would be managed as a VRM Class I and a VRM Class II. As a result, these areas would preserve or retain the existing character of the landscape.

Vegetation management under Alternative B would be similar to Alternative A, except on the 72,000 acres of lands with wilderness characteristics that are managed to protect those characteristics. Vegetation management and restorations would only be permitted on these acres if they enhance or preserve wilderness characteristics.

Alternative C

Of the 559,600 acres of lands with wilderness characteristics, 190,100 acres would be managed to protect wilderness characteristics while also providing for compatible uses under this alternative. There would also be 366,900 acres of lands with wilderness characteristics managed to minimize impacts on those characteristics while allowing compatible uses that are consistent with protection of GSENM objects. The remaining 2,600 acres of lands with wilderness characteristics would be managed for other compatible uses, and therefore providing minimal protection to wilderness characteristics. Compared with Alternative A, an additional 190,100 acres of lands with wilderness characteristics would be protected.

Under Alternative C, the 190,100 acres managed to protect lands with wilderness characteristics would be managed as a ROW exclusion area. Additionally, of the 366,900 acres managed to minimize impacts on lands with wilderness characteristics, 85,900 acres would be managed as a ROW exclusion area and 281,000 acres would be managed as a ROW avoidance area. Of the remaining 2,600 acres of lands with wilderness characteristics that would be managed for other compatible uses, 2,300 acres would be managed as a ROW avoidance, and 300 acres would be managed as a ROW exclusion. Compared with Alternative A, lands with wilderness characteristics would be more protected from ROW disturbances under this alternative because all the lands with wilderness characteristics would be managed as a ROW exclusion or avoidance area. As a result, this would protect more lands with wilderness characteristics from the development of ROWs that could impact the size of the lands with wilderness characteristics units. This would also protect the lands with wilderness characteristics from surface disturbances that

could impact the apparent naturalness, opportunities for primitive and unconfined recreation, and supplemental values.

Under Alternative C, the 190,100 acres managed to protect lands with wilderness characteristics would be closed to OHV use. Of the 366,900 acres managed to minimize impacts on lands with wilderness characteristics, 126,900 acres would be closed to OHV use and 240,000 acres would be limited to designated routes. There would also be 300 acres closed to OHV use and 2,300 acres limited to designated routes in areas that are managed for compatible use while not protecting lands with wilderness characteristics. Compared with Alternative A, lands with wilderness characteristics would be more protected from OHV use under this alternative because more acres would be closed to OHV use. This would increase the opportunities for solitude by restricting sight and sounds of vehicle use and other people. A decrease in motorized access in some lands with wilderness characteristics units could reduce opportunities for primitive nonmotorized recreation in adjacent areas by making remote trailheads less accessible during the hot and dry seasons. The decrease in motorized and mechanized access would also increase the opportunities for primitive recreation in lands with wilderness characteristic units and reduce impacts on apparent naturalness.

Under Alternative C, the 190,100 acres managed to protect lands with wilderness characteristics would be managed as VRM Class I. There would also be 1,300 acres of VRM Class I and 365,600 acres managed as VRM Class II on lands that are managed to minimize impacts on wilderness characteristics. There would be 100 acres managed as VRM Class I, 2,400 acres managed as VRM Class II, and 200 acres managed as VRM Class II on lands that are managed for compatible uses while not protecting wilderness characteristics. Compared with Alternative A, lands with wilderness characteristics would be more protected by VRM under this alternative because more acres would be managed as a VRM Class I and a VRM Class II. As a result, these areas would preserve or retain the existing character of the landscape.

The types of impacts from vegetation management and restorations on lands with wilderness characteristics under Alternative C would be the same as those described under Alternative B.

Alternative D

Of the 559,600 acres of lands with wilderness characteristics, 559,600 acres would be managed to protect wilderness characteristics while providing for compatible uses under this alternative. In comparison with Alternative A, which would continue to allow for other compatible uses and not outline any specific management restrictions in these areas, this alternative would protect wilderness characteristics while providing for compatible uses for all lands within GSENM that have been identified through the inventory process to protect wilderness characteristics.

Under Alternative D, there would be 559,600 acres that would be managed as a ROW exclusion area for lands that are managed to protect wilderness characteristics. Compared with Alternative A, lands with wilderness characteristics would be more protected from ROW disturbances under this alternative because all the lands with wilderness characteristics would be managed as a ROW exclusion area. As a result, this would protect more lands with wilderness characteristics from the development of ROWs that could impact the size of the lands with wilderness characteristics units. This would also protect the lands with wilderness characteristics from surface disturbances that could impact the apparent naturalness, opportunities for primitive and unconfined recreation, and supplemental values.

Compared with Alternative A, lands with wilderness characteristics would be more protected from OHV use under this alternative because no acres would be open to OHV use. This would increase the opportunities for solitude by restricting sight and sounds of vehicle use and other people. A decrease in motorized access in some lands with wilderness characteristics units could reduce opportunities for primitive nonmotorized recreation in adjacent areas by making remote trailheads less accessible during the hot and dry seasons. Reduced OHV use improves apparent naturalness by preventing user-created route proliferation, route widening or braiding, and dispersed camping impacts.

Under Alternative D, the 559,600 acres of protected lands with wilderness characteristics would be managed as a VRM Class I. Compared with Alternative A, lands with wilderness characteristics would be more protected by VRM under this alternative because all the lands with wilderness characteristics would be managed as a VRM Class I. As a result, these areas would preserve the existing character of the landscape.

The types of impacts from vegetation management and restorations on lands with wilderness characteristics under Alternative D would be the same as those described under Alternative B.

Cumulative Impacts

Past and present land management activities and natural disturbance processes on lands with wilderness characteristics have included livestock grazing management and range improvements, vegetation management and fuels management, and noxious weeds control. These activities include the Rangeland Wells and Pipelines and the KFO Noxious and Invasive Vegetation Management. These types of actions are anticipated to continue in the relatively foreseeable future and could impact the lands with wilderness characteristics. The KFO Noxious and Invasive Vegetation Management project has the potential to reduce the possibility of invasive vegetation along the boundary of GSENM and KFO lands.

Resource uses also include recreational use. Recreational use is expected to increase throughout GSENM and will alter the landscape over time through increased human presence, drone use, OHV use, dispersed camping, and hiking in certain areas. This can lead to increased disturbances, such as crowding, noise, route widening, and campsite expansion. These alterations could increase surface disturbance and degrade the apparent naturalness of the area.

Existing and foreseeable developments and managements are likely to impact lands with wilderness characteristics under Alternative A because they are not currently protected. Alternative B, C and D would have fewer impacts because wilderness characteristics would be managed to protect and minimize impacts. There could still be impacts from these activities seen in Alternatives B and C in the areas that would be managed for other compatible uses while not protecting lands with wilderness characteristics.

3.14.3 References

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BLM GIS (United States Department of the Interior, Bureau of Land Management geographic information system). 2022. GIS data used in the GSENM alternatives, affected environment, and impact analysis. Kanab, Utah. Last edited May 10, 2023.

3.15 FORESTRY AND WOODLAND PRODUCTS

Woodland resources in the decision area consist primarily of pinyon and juniper communities, with small, scattered patches of ponderosa pine forests, Douglas-fir forests, and aspen groves. Aspen is valuable because it contributes significantly to the species diversity of forest landscapes (Kivinen 2020). There has been a long-term reduction in the area of aspen forest in parts of Utah, and some aspen stands are not recovering or regenerating from disturbance the way they have in the past (Forest Service n.d.). The primary woodland product in the decision area is fuelwood harvesting. Cedar posts and Christmas trees are also harvested in smaller quantities.

3.15.1 Affected Environment

Current Conditions

Woodland Types

There are 858,300 acres of woodlands within the decision area. **Table 3-78** breaks this total down by woodland type and acreage. **Figure 3-14, Dominant Vegetation Types (Appendix A)** displays the major vegetation communities in the decision area, including the two dominant woodland types, Colorado Plateau pinyon-juniper woodland and Colorado Plateau pinyon-juniper shrubland.

Table 3-78. Woodland Types in the Decision Area

Woodland Type	Acres
Colorado Plateau Pinyon-Juniper Woodland	506,500
Colorado Plateau Pinyon-Juniper Shrubland	347,600
Southern Rocky Mountain Ponderosa Pine Woodland	1,600
Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland	1,200
Rocky Mountain Lower Montane-Foothill Riparian Woodland	800
Western Cool Temperate Urban Evergreen Forest	400
Interior West Ruderal Riparian Forest	100
Rocky Mountain Aspen Forest and Woodland	100
Total	858,300

Source: LANDFIRE 2022; BLM GIS 2022

Woodland Uses

Fuelwood is the primary woodland product in the decision area. Harvesting of cedar posts and Christmas trees also occurs to a lesser degree. Fuelwood harvesting, post cutting, and Christmas tree cutting are allowed throughout GSENM, except in WSAs and areas posted or signed as closed. **Table 3-79** shows the number of woodland products harvested by permit commercially and noncommercially over the past 8 years across GSENM. The BLM issues free use permits for oak harvesting, which is a traditional Native American use in the decision area.

The sale of forest treatment residues as secondary wood products or biomass is allowed, as are commercial and noncommercial timber harvesting for promoting or sustaining forest health.

Table 3-79. Woodland Products Harvested 2015–2022

Type	2015	2016	2017	2018	2019	2020	2021	2022
Cords of fuelwood*	1,459	1,439	1,228	1,160	832	879	913	850
Tons of fuelwood	2,480	2,446	2,088	1,972	1,414	1,494	1,552	1,445
Cedar posts**	25	40	38	108	140	190	990	480
Tons of cedar post biomass	0.125	0.2	0.195	0.54	0.7	0.95	4.95	2.4
Wood posts	0.46	0.28	0.00	2.19	0.91	2.09	8.52	4.95
Christmas trees	15	14	8	0	3	4	0	0

Sources: Allan Bate, GSENM forester, personal communication in July 2022, regarding woodland product harvest numbers for 2015–2021. Jason Bybee, GSENM forester, personal communication in March 2023, regarding woodland product harvest numbers for 2022. Forest Resource Information System, accessed July 3, 2023.

*1 cord = 2,500 pounds

**1 post = 10 pounds

Stewardship Contracts

Since 2005, the BLM has had a stewardship program that has actively promoted the utilization of biomass and the creation of a biomass industry. Congress authorized the stewardship program through September 2013 in the Omnibus Appropriations Bill of 2003 (Public Law 108-7, Section 323). The program required that any vegetation removal be a byproduct of the project goals. The stewardship program was designed to help achieve land management goals and objectives.

From 2005 through 2013, the BLM awarded 14 stewardship contracts in GSENM for land treatments on 1,757 acres, with a biomass volume approaching 4,400 tons, as shown in **Table 3-80**. Projects addressed a diverse set of land management objectives, including, but not limited to, improving forest health, wildlife habitat, and vegetation; reducing wildland fuels; administering livestock grazing; providing recreational opportunities; and achieving VRM class objectives.

Table 3-80. Stewardship Contracts 2005–2013

Fiscal Year	Stewardship Contact	Acres	Tons
2005	Buckskin Stateline	105	315
2007	Powerline 2	308	924
	Mustang 1	208	624
	Mustang 2	205	410
	Buckskin Research	82	164
	P/J 1	159	318
2008	Powerline 3	75	150
2009	Buckskin Sinkholes	95	285
	Pine Hollow 1	75	150
	Pine Hollow 2	52	104
	Pine Nut	132	396
2011	Buckskin Eagle Sink	101	202
2012	Telegraph 2012	80	160
2013	Telegraph	80	160
Total		1,757	4,362

Source: BLM 2018

In the Buckskin Mountain fuelwood area, the BLM has partnered with the UDWQ and the Watershed Restoration Initiative to treat (hand thin with chain saws) 6,239 acres of pinyon- juniper trees with a biomass volume approaching 12,600 tons. The project's purpose was to improve wildlife habitat by reducing the canopy cover of the pinyon-juniper trees. **Table 3-8I** outlines the hand-thinning projects in the Buckskin Mountain fuelwood area. **Figure 3-17** in **Appendix A** displays the variety of vegetation management that have occurred within the Buckskin Mountain and Rock Springs Bench fuelwood areas, although not all projects displayed are specific to fuels management.

No stewardship projects have been initiated since 2013 due to a lack of funding.

Table 3-8I. Buckskin Mountain Fuelwood Area Hand-Thinning Projects 2008–2013

Fiscal Year	Stewardship Contact	Acres	Tons
2008	Utah Partners for Conservation and Development 1, 2008	273	546
	Utah Partners for Conservation and Development 2, 2008	154	308
	Utah Partners for Conservation and Development 3, 2008	77	154
	Utah Partners for Conservation and Development Hand Thin, 2008	650	1,350
2009	Utah Partners for Conservation and Development Hand Thin, 2009	1,471	2,942
2011	Utah Partners for Conservation and Development Hand Thin, 2011	1,782	3,562
	Utah Department of Water Quality Hand Thin, 2011	604	1,208
	Utah Department of Water Quality Units, 2011	598	1,196
2013	Utah Department of Water Quality Hand Thin, 2013	630	1,260
Total		6,239	12,526

Source: BLM 2018

Note: The trees were hand thinned by a crew with chain saws. The pinyon-juniper trees were limbed and bucked up into 4-foot lengths. These treatment areas within the Buckskin Mountain fuelwood area are where most fuelwood harvesters have gathered their fuelwood since 2008. No acres have been treated within the Rock Springs Bench fuelwood area.

Trends

Due to past management, such as fire suppression, there are artificially high fuels loads across broad, remote landscapes. These pose unique management challenges in terms of the method (for example,

prescribed fire), the outcomes (for example, the potential for noxious and invasive infestations), and the management of human safety during wildfire response and treatments.

Similar to pinyon-juniper woodlands across the western United States, pinyon-juniper woodlands in GSENM have expanded over the past 150 or more years into vegetation types that were once mostly tree free (BLM 2018). For instance, some of the decision area's forested stands may be ecologically outside their natural range of variability. Although pinyon-juniper expansion has occurred in the planning area, some die-off has also been observed in stands along U.S. Highway 89 and State Route 12. The die-off is happening in drier areas and may be caused by a decrease in available water due to climate change.

In general, the demand for fuelwood harvesting has been relatively stable. The supply is ubiquitous and plentiful, except for areas that have burned or received some type of vegetation management with tree thinning as a goal.

Forecasts

Based on the existing harvest demand, forest and woodland resources provide many opportunities for future harvest of woodland products (that is, post, fuelwood, and Christmas trees). The relatively stable demand for forest and woodland products is expected to continue in the future. However, demand could increase if areas outside WSAs remain open for fuelwood harvesting and the public's awareness of harvesting opportunities increases. The demand for products generated from stewardship contracts would likely increase if new funding is identified, depending on the future of the biomass and bio-energy industries.

Stands that are outside their ecological range should be evaluated for either 1) site-specific projects to restore original vegetation types, or 2) future management as "persistent" woodlands.

Climate change and ongoing drought may require more regular evaluation of unique woodland stands to preserve GSENM's objects. Understanding the health of these stands would allow for prioritization and flexible and adaptive management actions.

3.15.2 Environmental Consequences

Refer to **Section F.20**, Forestry and Woodland Products, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would vegetation management decisions affect woodland and forestry product harvest in the planning area?

Impacts Common to All Alternatives

The goals, objectives, and management actions common to all alternatives for woodlands and forests would help maintain forests in the long term by balancing forest health with forest uses. The management actions would allow for woodland product harvest throughout the life of the plan. Under all alternatives, the goal for forestry and woodland products is to promote, sustain, and improve forest health.

The planning area is expected to experience an increase in extreme temperatures and weather, a decrease in water availability, and an increase in fire risk as climate trends continue and become more pronounced.

Regardless of the alternative, the effects of climate change would likely combine with and exacerbate some of the effects that result from implementing the alternatives. This, in turn, would affect forestry and woodland products. Increased extreme temperatures, weather events, fire frequency, and fire size could increase the amount of type conversion to communities dominated by invasive annual grasses. This would lower the ecological resilience to future disturbance and thereby alter forestry and woodland product availability.

Since the effects on forestry and woodland products from weather and changing climate would not vary substantially across alternatives, climate change impacts are not discussed further.

Continuing to monitor for and control invasive plant species and noxious weeds using an integrated weed management program would slow the establishment and spread of weeds in the planning area. Where these treatments are carried out, it would help to promote, sustain, and improve forest health.

Warming temperatures, drought, and other extreme weather could lead to an increased fire risk. Effects are expected to increase in frequency and will likely contribute to impacts on forestry and woodland products. The Colorado Plateau Rapid Ecological Assessment suggests the ecoregion is expected to undergo general warming, with as much as a 3.6°F (2°C) increase by 2060 in some locations, particularly in the southern portion of the ecoregion (Bryce et al. 2012, p. 130). Since the effects on forestry and woodland products from fire would not vary substantially across alternatives, fire management is not discussed further.

Alternative A

Under Alternative A, the objective to improve forest and woodland health to protect plant populations, watershed values, and support wildlife habitat requirements would continue. Alternative A would continue to prohibit the removal of ponderosa pine for Christmas trees. Alternative A would continue to allow commercial timber harvesting for the purposes of promoting or sustaining forest health across the entirety of GSENM. Approximately 984,500 acres would remain open to commercial and noncommercial harvest. The VSA acreage would remain closed to commercial and noncommercial woodland products. The management direction for commercial and noncommercial fuelwood harvesting under Alternative A would allow for noncommercial fuelwood harvesting, post cutting, and Christmas tree cutting, except in VSAs and areas posted or signed as closed to meet forestry goals and objectives otherwise designated or subject to a stipulation. The BLM would continue to manage areas with ponderosa pine and aspen to maintain and improve the stand health.

Management direction for Alternative A would allow for permit harvesting of woodland products in riparian areas for the maintenance or improvement of riparian ecosystems. Management direction for Alternative A also would allow for the sale of forest treatment residues as secondary wood products or biomass.

Landscape-scale restoration projects would not be implemented under this alternative, but individual woodland product removal and rangeland restoration projects would likely still occur. Continuing to protect, enhance, and restore vegetation communities in accordance with the ecological site potential would help maintain the vegetation community ecological processes and functions where treatments are implemented. Where treatments are carried out, forest and woodland health could be improved. However, as climate and fire trends become more pronounced, it is likely the resilience of treated

vegetation communities would decrease unless specific consideration is given to increasing climate resiliency. Climate and fire trends could impact forest and woodland health negatively by the spread of noxious and invasive species and increased fire potential.

Recreation could impact forestry and woodlands by spreading noxious and invasive weeds, increasing the risk of wildfire, and causing ground disturbances, especially OHV use. Outside of WSAs, where commercial and noncommercial timber harvest is prohibited, OHV use is limited to designated routes and Alternative A would allow motorized travel on the most miles of routes. Therefore, Alternative A has the greatest potential to spread noxious and invasive weeds and increase the risk of wildfire, which would impact the availability of timber for harvest.

Alternative B

Under Alternative B, the objective is to maintain and restore forest and woodland health to protect watershed values, support wildlife habitat requirements, and reduce the potential for catastrophic wildfires.

Under Alternative B, the BLM would not open any acres to commercial harvest and open 906,300 acres to noncommercial harvest. The remaining acres would be closed to noncommercial woodland products. Management direction for Alternative B would prohibit the commercial harvest of forest and woodland products but would allow for the noncommercial harvest of forestry and woodland products through the authorization of a permit, if the harvest would maintain watershed values, support wildlife habitat requirements, and reduce the potential for catastrophic wildfires. However, Alternative B would prohibit noncommercial harvest of forestry and woodland products in the following areas:

- WSAs
- Lands with wilderness characteristics managed for protection
- Ponderosa pine, Douglas-fir, mixed conifer, and aspen stands
- Areas undergoing restoration
- 330 feet from riparian areas

Management direction for Alternative B would prohibit the felling or destruction of old-growth trees (live and dead). Alternative B would protect the ecological context of such trees through buffers around associated intact, natural ecological features.

Alternative B would make the treatment residues (for example, wood and other timber products left after treatments) available for collection and removal, if this would maintain and restore ecosystem health.

The primary difference between Alternative B and Alternative A is that Alternative B would prohibit the commercial harvest of forestry and woodland products in all areas and would prohibit the noncommercial harvest of forestry and woodland products in certain areas (such as lands with wilderness characteristics managed for protection); Alternative A would not prohibit noncommercial harvest in these areas.

Alternative B would be more restrictive compared with Alternative A. This is because Alternative B would prohibit the commercial harvest of forestry and woodland products, whereas Alternative A would allow commercial harvesting except for the removal of ponderosa pine for Christmas trees. This could mean that companies currently doing commercial harvest in GSENM would no longer be able to do so.

Alternative B would be more restrictive compared with Alternative A regarding noncommercial harvest of forestry and woodland products because Alternative B would require a permit with stipulations regarding ecosystem health. It also would prohibit noncommercial harvest in particular areas (such as lands with wilderness characteristics managed for protection). However, use of a permit system for noncommercial harvest would allow for better tracking of forestry and woodland product harvest and could provide better data to monitor forest health.

Likewise, fewer opportunities for woodland product harvest would occur when more areas are closed to harvest under Alternative B. This could result in the public and tribes being unable to collect products in certain locations due to harvest restrictions.

Proactive vegetation management to increase vegetation community climate resiliency would help maintain the extent and function of vegetation communities in the longer term, as climate trends become more pronounced. Treatments would likely be focused in areas where noxious and invasive weeds are the most prevalent or where pinyon and juniper trees have encroached on historical sagebrush communities. As a result, forestry and woodland health would have more improvement compared with under Alternative A.

Recreation could impact forestry and woodlands by spreading noxious and invasive weeds, increasing the risk of wildfire, and causing ground disturbances, especially OHV use. Under Alternative B, the BLM would not open any acres to authorized OHV use. OHV use would be limited to designated routes on 912,500 acres, and 953,100 acres would be closed to OHV use. Compared with Alternative A, Alternative B would have fewer acres open to OHV use, thereby reducing the risk of damage, fragmentation, and surface disturbances on woodland resources.

Alternative C

The objective for Alternative C is the same as the Alternative B objective.

Under Alternative C, the BLM would not open any acres to commercial harvest and would open 88,000 acres to noncommercial harvest. The remaining acres would be closed to noncommercial woodland products. Management direction for Alternative C would prohibit the commercial harvest of forest and woodland products but would allow for the noncommercial harvest of forestry and woodland products through the authorization of a permit in the designated wood harvesting areas. However, Alternative C would prohibit noncommercial harvest of forestry and woodland products in the following areas:

- WSAs
- Lands with wilderness characteristics managed for protection
- Ponderosa pine, Douglas-fir, mixed conifer, and aspen stands
- Areas undergoing restoration
- 330 feet from riparian areas

The management direction stated above is more restrictive than Alternative A, which only would prohibit the removal of ponderosa pine for Christmas trees and allow for noncommercial harvest for the purposes of promoting or sustaining forest health.

Alternative C would allow noncommercial harvest on 88,000 acres, a 91 percent reduction from Alternative A.

Recreation could impact forestry and woodlands by spreading noxious and invasive weeds, increasing the risk of wildfire, and causing ground disturbances, especially OHV use. Under Alternative C, the BLM would not open any acres to cross-country OHV use. OHV travel would be limited to designated routes on 714,900 acres, and 1,210,100 acres would be closed to OHV use. Compared with Alternative A, Alternative C would have fewer acres open to OHV use, thereby reducing the risk of damage, fragmentation, and surface disturbances on woodland resources.

Managing recreational areas under Alternative C could similarly concentrate recreational use, including motorized use into areas that provide facilities catering to these uses. This could also concentrate the potential disturbance. This would likely include the front country and passage areas, which would provide the greatest number of developed facilities. Potential effects in the outback area would be limited to designated roads and routes. The potential for recreation effects would be lowest in the primitive area, as motorized use and developed facilities would not be present.

Alternative D

Alternative D's objective is to maintain, enhance, and/or restore forest and woodland health. This objective differs from Alternative A's objective to improve forest and woodland health. Both alternatives aim to protect watershed values and wildlife habitat.

Under Alternative D, the BLM would open no acres to commercial harvest and noncommercial harvest. Alternative D would be similar to Alternative B, except Alternative D would prohibit commercial and noncommercial harvest of forestry and woodland products unless the harvest furthers the protection of GSENM objects.

In terms of management direction for commercial and noncommercial fuelwood harvest, Alternative D would be more restrictive than Alternative A because the use would not be allowed.

Vegetation management under Alternative D would prioritize natural processes and techniques, compared with active restoration under Alternative A.

Cumulative Impacts

The BLM-managed, Forest Service-managed, NPS-managed, and adjacent state, tribal, county, and privately owned land surrounding GSENM are the cumulative effects analysis area for forestry and woodland products management. Ongoing and planned actions in and near GSENM would influence forestry and woodland products management's effectiveness on a regional scale. The time frame for cumulative environmental consequences for future actions is the life of the plan.

The cumulative impacts of past and present management actions on woodlands in the planning area are captured in the description of the affected environment (**Section 3.15.1**).

Reasonably foreseeable future actions in GSENM have the potential to impact forestry and woodland products management; these are generally projects that would alter product harvest areas or access to woodland and forest harvest areas, or sustain or increase forest health and future harvest opportunities. Projects that are anticipated to sustain or increase forest health and maintain opportunities for future

forestry and include the Skutumpah Terrace Greater Sage-grouse Habitat Restoration Projects and post-fire restoration projects. Projects that may increase the potential for human-caused fire ignitions are ROW development projects, including the Newer Garkane Transmission ROW (Buckskin-to-Fredonia Powerline), the Garkane Transmission ROW, and Lake Powell Pipeline ROW.

Proposed forestry and woodland product harvest management activities under Alternatives B, C, and D would contribute to the cumulative effects of regional fire and fuels management by other agencies and stakeholders. These efforts would contribute to maintaining and restoring forest and woodland health to protect watershed values, support wildlife habitat requirements, and reduce the potential for catastrophic wildfires. Where Alternatives B, C, and D that prioritize forest restoration and woodland health could have greater contributions toward these effects.

3.15.3 References

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3.16 LIVESTOCK GRAZING

Presidential Proclamation 10286 speaks specifically to livestock grazing by stating:

“The Secretary shall manage livestock grazing as authorized under existing permits or leases, and subject to appropriate terms and conditions in accordance with existing laws and regulations, consistent with the care and management of the objects identified above and in Proclamation 6920. Should grazing permits or leases be voluntarily relinquished by existing holders, the Secretary shall retire from livestock grazing the lands covered by such permits or leases pursuant to the processes of applicable law. Forage shall not be reallocated for livestock grazing purposes unless the Secretary specifically finds that such reallocation will advance the purposes of this proclamation and Proclamation 6920.”

3.16.1 Affected Environment

Current Conditions

The livestock grazing decision area is 2,231,200 acres and is comprised of all BLM-managed livestock grazing allotments in the GSENM, as well as those that overlap Glen Canyon, the BLM KFO, the BLM Arizona Strip Field Office, and those that overlap with neighboring agencies, such as the State of Utah. The livestock grazing decision area contains 2,116,200 acres available for livestock grazing and 125,800 allotted acres that are wholly or partially unavailable for livestock grazing (**Table 3-82** and **Figure 2-14, Appendix A**). Allotments that are wholly or partially unavailable for livestock grazing include 88,600 acres in Glen Canyon. An additional 35,500 acres within the livestock grazing decision area are available for livestock grazing but are not being grazed, including 1,608 acres in Glen Canyon. Approximately 101 permittees have permits to graze on 76 active allotments in the decision area. There are 10 allotments that are completely or partially unavailable for grazing, in addition to some unallotted areas in Glen Canyon. Approximately 10 previously unavailable allotments have been made available for grazing, but livestock are currently not present; because no permits have been authorized for these allotments, no AUMs have been allocated.

Table 3-82. Acres Available and Unavailable for Livestock Grazing Allotments

Status	Acres	AUMs
Available	2,121,600	106,202
Unavailable	109,600	—

Source: BLM GIS 2022

The total permitted grazing in the livestock grazing decision area is 106,202 AUMs, which includes 76,957 active AUMs and 29,245 suspended AUMs. The 2020 Approved GSENM and KEPA RMPs directed the BLM to permit 107,995 AUMs. The increase in AUMs is attributed to the 10 previously closed allotments that were made available but where no permits have been authorized. The 2020 Approved RMPs also directed the BLM to activate all suspended AUMs (BLM 2020a, 2020b). However, the BLM has not yet completed any permit renewals that would move the suspended AUMs to the active category.

The Little Bowns Bench Allotment (130 AUMs), the Wolverine Pasture of the Deer Creek Allotment (148 AUMs), and the Phipps Pasture of Phipps Allotment (140 AUMs) total 14,603 acres designated as forage reserves²⁶ (BLM 2020a). Together these three allotments can supply up to 418 AUMs in emergency situations. Ten-year permits are not issued in these areas.

Trends

Table 3-83 displays the active use and the actual use of AUMs billed between 1996 and 2020. Actual use means where, how many, and what kind or class of livestock, and how long livestock graze on an allotment, or on a portion or pasture of an allotment (43 CFR 4100.0–5).

²⁶ Forage reserve allotments are a designation for a type of allotment on which there is no current term permit obligation for some portion of or all the estimated livestock grazing capacity, and where there has been a project-level environmental analysis and decision made to infrequently use the available forage on the allotment to enhance management flexibility for authorized livestock use or to achieve a desired vegetation condition.

Table 3-83. Livestock Grazing Season of Use, Permitted AUMs, and Actual Use AUMs

Allotment	Season of Use	Allotment Acres*	Permitted Use (AUMs)	Actual Use ¹ (AUMs)
				25-Year Average (1996–2020)
Alvey Wash	May 15–September 30	72,400	1,424	819
Antone Flat ^{3, 6}		15,000	none allocated	Nonuse
Big Bowns Bench ^{4, 7}	November 1–March 31	18,600	750	172 ²
Big Horn	November 1–June 15	50,215	3,515	1796 ²
Black Ridge	November 1–May 31	11,700	903	357 ²
Black Rock	June 6–October 16	9,300	408	400 ²
Black Rock (State of Utah)	June 6–October 16	1,300	64	<i>Actual use averages are included in the Black Rock section</i>
Boot	August 1–October 31	2,700	45	41 ²
Boulder Creek	September 1–December 31	4,500	80	26 ²
Bull Run (State of Utah)	July 1–February 28	600	5	<i>No use of the allotment since the BLM acquired it in 1998</i>
Bunting Trust (State of Utah)	May 15–November 30	200	16	15 ²
Calf Pasture	June 10–August 10 (even years) August 10–October 15 (odd years)	2,800	176	60
Circle Cliffs	November 1–March 31	30,300	1,050	585 ²
Clark Bench	November 1–April 30	25,200	1,238	477
Cockscorn	March 1–May 31	2,800	36	18
Collet	June 16–September 15	16,700	97	78 ²
Cottonwood	November 1–May 31	103,300	3,188	2,306 ²
Coyote	November 1–May 31	38,900	2,044	1,173 ²
Death Hollow	November 1–March 31 April 1–May 15	19,500	1,057	553 ²
Deer Creek	November 1–February 28	18,000	358	136
Deer Creek-Wolverine Pasture ⁵	October 1–March 31	(3,800)	148	0
Deer Range	August 1–October 15	11,100	231	85
Deer Spring Point	June 10–October 17	25,000	585	246
Dry Valley	March 1–December 31 March 1–January 31 July 1–October 31	11,400	699	585
Escalante River ⁴	n/a	59,300	unavailable	unavailable
First Point	June 1–December 31	3,000	410	89
Five Mile Mountain	November 1–April 30	17,800	385	145
Flood Canyon	July 1–October 31	13,600	148	46
Ford Well	June 10–October 9	9,100	300	196
Fortymile Ridge ⁴	October 15–May 31	57,900	4,290	2,481 ²
Granary Ranch	July 1–November 30	2,000	70	33
Hall Ranch	March 1–February 28	30	12	5 ²
Harveys Fear ⁴	n/a	4,300	unavailable	unavailable
Haymaker Bench	November 1–February 28	3,200	100	61 ²
Headwaters	November 1–March 15	154,400	3,469	2,452
Hells Bellows	May 1–October 15	2,100	44	41
Johnson Canyon	June 1–November 15	10,100	274	122
Johnson Lakes	June 1–November 30	11,100	347	222
Johnson Point	November 1–March 31	2,300	135	2
King Bench	November 1–March 31	54,300	1,515	1002 ²
Lake ⁴	June 1–September 30	22,700	1,310	530
Lake Powell ⁴	October 15–March 15	400	20	Nonuse
Last Chance ⁴	March 1–February 28	250,100	4,642	1,366

3. Affected Environment and Environmental Consequences (Livestock Grazing)

Allotment	Season of Use	Allotment Acres*	Permitted Use (AUMs)	Actual Use ¹ (AUMs)
				25-Year Average (1996–2020)
Little Bowns Bench ^{5, 6}	October 1–March 31	3,400	130	135 ²
Locke Ridge	December 1–April 30	4,500	172	106 ²
Long Canyon Stock Driveway ³	n/a	1,000	None allocated	Nonuse
Long Neck ^{3, 6}	May 1–May 31	200	None allocated	Nonuse
Lower Cattle ⁴	October 1–April 15	81,400	7,488	4,523 ²
Lower Hackberry	October 15–March 15	20,200	435	243
Lower Warm Creek ⁴	November 1–March 31	15,900	225	64 ²
Main Canyon	June 1–September 30	300	14	17 ²
McGath Point ^{3, 6}	n/a	3,100	None allocated	Nonuse
Meadow Canyon	September 1–November 30	4,700	144	107 ²
Mollies Nipple	March 1–February 28	102,400	3,880	2,980 ²
Moody ⁴	November 1–March 31	43,300	909	476 ²
Mud Springs	July 15–October 15	15,700	277	140
Muley Twist	n/a	2,200	unavailable	unavailable
Navajo Bench ⁴	n/a	12,900	unavailable	unavailable
Neaf	March 1–November 30	1,300	9	2
Nipple Bench ⁴	December 1–April 30	30,500	1,042	360 ²
No Mans Mesa	n/a	1,500	unavailable	unavailable
Phipps ^{5, 6}	October 1–March 31	10,400	140	101 ²
Pine Creek	September 16–October 31	3,800	144	84 ²
Pine Creek (State of Utah)	November 1–January 31	600	27	<i>included in Pine Creek Section above</i>
Pine Point	June 16–October 15	8,800	365	186
Rattlesnake Bench	n/a	3,600	unavailable	unavailable
Rock Creek-Mudholes ⁴	March 1–February 28	76,800	2,173	863 ²
Rock Reservoir	November 10–May 10	1,100	22	<i>no data</i>
Round Valley	November 1–March 31	9,900	522	314
Roy Willis	November 1–March 15	200	9	4
Rush Beds	November 1–April 30	18,800	252	82 ²
Salt Water Creek ⁶	March 16–June 15	12,100	120	Nonuse
	October 16–December 15			
School Section	May 1–April 30	800	102	30 ²
Second Point	August 1–September 30	5,900	98	31 ²
Sink Holes	November 1–April 1	6,600	154	70 ²
Slick Rock (State of Utah)	June 1–June 30	600	24	5 ²
Soda ⁴	October 1–May 31	70,400	2,798	1,406 ²
South Fork	March 1–February 28	100	12	7 ²
Spencer Bench ⁴	n/a	8,500	unavailable	unavailable
Steep Creek ⁶	November 1–March 31	7,500	318	unavailable
	May 15–June 16			
Swallow Park	May 1–October 31	16,500	1,076	525
Timber Mountain	June 16–October 15	7,700	426	198
Unallotted (NPS)	n/a	1,600	None allocated	Nonuse
Upper Cattle ⁴	November 1–June 15	92,400	8,158	5,233
Upper Hackberry	November 1–March 31	22,800	654	350 ²
	April 16–June 15			
Upper Paria	May 1–June 10	111,200	2,833	1,437
	May 1–September 30			
Upper Warm Creek ⁴	November 1–May 31	77,300	1,638	634 ²
Varney Griffin	n/a	15,300	None allocated	Nonuse
Vermilion	February 16–February 28, 2014	43,100	2,849	1,142 ²
	March 1–May 15			
	June 1–September 15			

Allotment	Season of Use	Allotment Acres*	Permitted Use (AUMs)	Actual Use ¹ (AUMs)
				25-Year Average (1996–2020)
	October 1–January 15			
Wagon Box Mesa ⁴	November 1–March 31	29,000	637	252 ²
Wahweap	December 1–April 30	17,200	491	329 ²
White Rock	December 1–January 31	1,400	60	25 ²
White Sage	May 6–June 5	2,500	76	22
Wide Hollow	October 1–December 31	3,800	353	254 ²
Willow Gulch	November 1–March 31	12,900	474	66 ²
	December 1–January 31			
Wiregrass ⁴	November 1–March 31	19,600	99	76

Source: BLM GIS 2022

* Acres rounded to the nearest 100 acres

¹ Actual use is supplemented with billed use where actual use data are not available.

² Period includes years with nonuse. Some data for 2013 are not available and could not be included in the averages.

³ Allotment was previously unavailable to grazing or available but unallotted; currently it is available.

⁴ Allotment is partially or wholly in Glen Canyon.

⁵ Forage reserve

⁶ Allotment currently has a pending application for permit to graze livestock.

⁷ The existing holder voluntarily relinquished the grazing permit for the Big Bowns Bench Allotment. As such, the lands are retired from livestock grazing consistent with Proclamation 10286 of October 8, 2021 (86 *Federal Register* 57335).

Proper riparian management and improvement continues to be a high priority. Riparian areas comprise only a small fraction of the total BLM-managed acreage but receive a disproportionate amount of use, while providing key habitat for wildlife. The BLM coordinates water quality monitoring with other federal, state, and technical agencies, and BLM Utah Rangeland Health Standards are assessed according to BLM Handbook H-4180-1, Rangeland Health Standards (BLM 2001).

Livestock grazing allotments in the livestock grazing decision area that do not meet BLM Utah BLM Utah Standards and Guidelines for Rangeland Health²⁷ due to livestock grazing are Rock Creek-Mudholes and Vermilion. Grazing was a contributing factor, but not the sole causal factor, for Standard 4 not being met in the Headwaters, Last Chance, and Nipple Bench Allotments. Standard 4 was not met for the Cottonwood, Coyote, Fortymile Ridge, and Upper Paria Allotments, but this was due to factors other than livestock grazing. There are additional allotments in the livestock grazing decision area that did not meet Standard 4 due to natural conditions and the geology. Because the factors for not meeting Standard 4 are not issues that the BLM can resolve through management, the allotments were considered to meet BLM Utah Rangeland Health Standards; those allotments are Deer Springs Point, Wahweap, and Wiregrass (BLM 2006).

Table 3-84 summarizes the allotments not meeting rangeland health standards and the actions taken since 2006. The BLM continues to monitor and assess rangeland conditions through a variety of landscape-scale and site-specific data, such as AIM Strategy data, the landscape monitoring framework, and the LANDFIRE VCC. However, few land health assessments have been completed since 2006.

²⁷ The BLM Utah Rangeland Health Standards are available at https://eplanning.blm.gov/public_projects/2018159/200520802/20059148/250065330/Standards%20and%20Guidelines%20for%20Rangeland%20Health.pdf.

Table 3-84. Allotments Not Meeting Rangeland Health Standards and Actions Taken Since 2006

Allotment	Standard Not Met				Changes to Grazing Management ¹	Assessments Since 2006 Determinations
	1	2	3	4		
Circle Cliffs	X	X	X		<ul style="list-style-type: none"> Restored the Lampstand, Onion Beds, and Prospect pasture seedings (2,500 acres) Limited grazing use in the Gulch pasture to no later than March 15 	PFC assessments in 2007 and 2012
Collet		X	X		<ul style="list-style-type: none"> Increased use supervision to control unauthorized livestock Coordinated 28 percent voluntary nonuse to meet BLM resource objectives (2007–2013) 	PFC assessment in 2012
Cottonwood		X		X ²	<ul style="list-style-type: none"> Upgraded and maintained the Coyote well, pipeline, and associated infrastructure Maintained Jack Riggs and Butler Valley water systems Voluntary nonuse of the riparian pasture to trailing and emergency use Restored the Eight Mile seeding (2008–2009) Installed solar pump on Butler Valley well (2012) Implemented two separate experimental rotation systems 	PFC assessments in 2007, 2010, 2013, and 2014
Coyote	X		X	X ²	<ul style="list-style-type: none"> Restored 2,634 acres of seeded pasture (2009) Upgraded and maintained the Coyote well, pipeline, and infrastructure 	Restoration monitoring conducted annually for first 5 years after project completion
Death Hollow		X			<ul style="list-style-type: none"> 100 percent voluntary nonuse to meet resource objectives (2006–2007); voluntary nonuse during spring in 2002–2006 and 2012 Cleaned and reconstructed stock ponds between Wolverine and Horse Canyon (2008) 	Riparian monitoring in 2012; PFC assessments in 2013
First Point		X			<ul style="list-style-type: none"> Fenced First Point Spring to exclude livestock (2007) Maintained off-site water at First Point Spring 	PFC assessments in 2007
Ford Well		X			<ul style="list-style-type: none"> Fenced Old Corral Spring and Ford Well Spring to exclude livestock Provided off-site water at both springs, improving distribution 	PFC assessments in 2007

3. Affected Environment and Environmental Consequences (Livestock Grazing)

Allotment	Standard Not Met				Changes to Grazing Management ¹	Assessments Since 2006 Determinations
	1	2	3	4		
Fortymile Ridge ³		X		X ²	<ul style="list-style-type: none"> • 22 percent voluntary nonuse to meet resource objectives (2006–2012) • Maintained spring protection fences (2008) • Maintained the Wilcox Spring protection fence • Returned a portion of the Wilcox Spring flow to spring to recover riparian vegetation (2010) • Used supplement to improve livestock distribution (2006 to present) 	PFC assessments in 2007 and 2014 Upland assessments in 2014
Headwaters		X		X ⁴	<ul style="list-style-type: none"> • Implemented invasive weed management starting in 2001 • Changed season of use so livestock is off allotment on March 15 • Limited livestock use in the Wahweap “Box” riparian area 	PFC assessments in 2010 and 2014
Hells Bellows		X			<ul style="list-style-type: none"> • 100 percent voluntary nonuse in 2007 	PFC assessments in 2007
Lake ³		X	X		<ul style="list-style-type: none"> • Removed more than 80 feral cattle • Maintained pasture and spring protection fences • Complete nonuse of the allotment from 2001–2003 and in 2007 	PFC assessment in 2007
Last Chance ³		X		X ⁴	<ul style="list-style-type: none"> • 76 percent voluntary nonuse to meet resource objectives (2006–2012) • Removed feral cattle from the allotment (2003–present) • Maintained exclosure fence around Relishen Seep (2005) 	PFC assessments in 2010 and 2014
Lower Cattle ³		X	X		<ul style="list-style-type: none"> • 33 percent voluntary nonuse to meet resource objectives (2006–2012) • Implemented a water-controlled, deferred rest rotation grazing system to better manage livestock distribution (2007–present) • Maintained stock ponds to improve water availability and distribution • Used supplement to improve livestock distribution (2006-present) • Used water-based rotation/distribution 	PFC assessments in 2007, 2013, and 2014 Upland assessments in 2014

3. Affected Environment and Environmental Consequences (Livestock Grazing)

Allotment	Standard Not Met				Changes to Grazing Management ¹	Assessments Since 2006 Determinations
	1	2	3	4		
Mollies Nipple	X	X	X		<ul style="list-style-type: none"> Restored three seeded pastures 27 percent voluntary nonuse to meet objectives (2006–2012) Due to drought, made adjustment to livestock use Administered deferred rest rotation Maintained Seaman Wash pipeline (2007) Fenced Wildcat Spring (2009) Constructed water developments in the Buckskin pasture (Sink Hole and Buckskin catchments) Maintained two stock ponds in Buckskin pasture in 2007 Fenced and restored springs 	PFC assessments in 2010 and 2013 Upland assessments in 2014
Nipple Bench ³		X		X ⁴	Livestock grazing is not the causal factor for not meeting rangeland health standards. The road through the riparian area is constricting the ability to move toward meeting standards.	None
Rock Creek-Mudholes ³		X		X	<ul style="list-style-type: none"> Removed more than 65 feral cattle (2006–2008) Permittee removed more than 25 additional feral cattle (2009–present) Maintained four spring fences Maintained pasture fences Implemented 100 percent nonuse to meet BLM resource objectives (2001–2006) Coordinated partial voluntary nonuse (2007–present) 	PFC assessments in 2015
School Section			X		<ul style="list-style-type: none"> Implemented 100 percent nonuse to meet resources objectives (2007–2010) Approximately 70 percent voluntary nonuse (2009–present) 	Upland assessments in 2013
Soda ³	X	X			<ul style="list-style-type: none"> Removed more than 45 feral cattle (2003–2004) Maintained Cottonwood Spring protection fence (2010) Maintained stock ponds and catchments (2011) Maintained and improved Hole in the Rock well (2008) 100 percent nonuse to meet objectives (2002–2005) Ensured that rotational grazing system is avoided after March 31 on consecutive years 	PFC assessments in 2013 and 2014 Upland assessments in 2014

3. Affected Environment and Environmental Consequences (Livestock Grazing)

Allotment	Standard Not Met				Changes to Grazing Management ¹	Assessments Since 2006 Determinations
	1	2	3	4		
Swallow Park		X			<ul style="list-style-type: none"> In the Bullrush Hollow pasture voluntary season of use, deferred use in summer and critical spring growing season Implemented voluntary partial nonuse to meet resource objectives (2001–2008) 	PFC assessments in 2010
Upper Paria	X	X		X ²	<ul style="list-style-type: none"> Repaired and maintained erosion control structures in the Mudholes pasture (2005) Completed restoration on 300 acres of seeded pasture in the Mudholes and Upper Jim Hollow pastures (2005) 39 percent voluntary nonuse to meet resource objectives (2003–2013) Installed riparian spring protection fence at Between the Creeks Spring (2008) Repaired and upgraded spring development and spring protection fence at Dick Ott Spring (2006) Maintained and upgraded the Sheep Creek pipeline and cleaned Upper Jim stock ponds (2006) Installed 1-acre monitoring exclosure in Mudholes seeding for frequency/cover monitoring 	PFC assessments in 2010
Vermilion	X	X	X	X	<ul style="list-style-type: none"> Maintained Sand, Cole, and Nephi spring protection fences; restored spring boxes (2007) Completed seeding restoration in Resource Conservation Areas 1, 2, and 3, and Fossil Wash pastures (2006) 81 percent voluntary nonuse to meet resource objectives (2006–2012) Completed Sink Holes catchment in Government Reservoir pasture Maintained Fossil Wash stock pond (2007) 	PFC assessments in 2012, 2013, and 2014 Upland assessments in 2014

Source: BLM 2006; BLM GIS 2022

¹ This list is not all inclusive. It is intended to give an indication of actions taken by the BLM and grazing permittees to make progress toward meeting rangeland health standards.

² Livestock grazing was determined not to be a cause in not meeting Standard 4.

³ Allotment is partially or wholly in Glen Canyon.

⁴ Livestock grazing was determined to be a contributing factor in not meeting Standard 4.

Forecasts

The BLM forecasts that the demand for livestock forage and livestock permits will continue and will likely increase. Kane and Garfield Counties have expressed interest in improved land health and increased grazing levels. Local ranchers have stressed the importance of the area to their ranching operations and the importance of ranching to their families. While the future demand for grazing on BLM-managed lands to help make local operations viable will likely increase, demands for other uses of BLM-managed lands will increase. An overall increase in area visitation has also resulted in livestock grazing and recreational use conflicts (such as access issues and range improvement damage).

There is direct competition for forage and water between livestock and wildlife in some areas, especially in riparian areas. However, there are a variety of structural and nonstructural range improvements across the livestock grazing decision area to reduce wildlife-livestock conflicts, including fences, corrals, cattle guards, line cabins, water pipelines, well developments, spring developments, stock ponds, water catchments, seedings, and vegetation enhancement projects. Range improvements are generally used to assist with livestock management, but some (for example, fences) are also used to assist with wildlife management. Development of more water sources has the potential to shift grazing from the areas that have a history of heavy use to areas previously not grazed or lightly grazed. In addition, water developments provide for the development of grazing management systems, which improve resource conditions. Fence-riding by operators, or periodically inspecting fences by horseback or vehicle, and placing salt-licks is employed to improve livestock distribution to prevent high-use areas from developing.

As discussed in **Section 3.3, Vegetation**, ongoing and planned vegetation management provide quality habitat for wildlife and livestock. Vegetation management may involve rest from grazing for the establishment of seeded species.

3.16.2 Environmental Consequences

Refer to **Section F.21, Livestock Grazing**, in **Appendix F, Analytical Framework**, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management impact livestock grazing and ranching operations under existing permits and leases?
- How would proposed management affect rangeland condition?

This analysis assesses the potential impacts on rangelands and grazing in all current allotments in the livestock grazing decision area. Because grazing operations are generally confined to allotments, the discussion of the impacts from the alternatives below would apply only to allotments available and unavailable for grazing in GSENM. This includes those that are active, vacant, forage reserves, or closed. Impacts are analyzed for the life of this RMP.

Several management actions would impact permitted livestock grazing. These include changes to the terms and conditions of livestock grazing permits, land allocation decisions, activities associated with the lands and realty program, changes to recreation management and recreation activities, special land use designations, and changes to vegetation and forest management.

The indicators of effects on livestock grazing from GSENM management include changes to allotment availability or acres available for grazing; changes to the terms and conditions of grazing permits, including alterations to the stocking rate, season of use, and permitted AUMs; and the quality and quantity of forage in allotments, including forage removal through land use allocations or anticipated changes to forage from vegetation management.

Impacts Common to All Alternatives

The BLM would manage rangelands consistent with protection of GSENM objects of historic or scientific interest. Management to protect GSENM objects across the decision area could result in changed terms and conditions of grazing permits to prevent impacts from livestock on GSENM objects. Changes could include reduced stocking rate, changed duration or season of use, or other flexibilities in grazing permits to promote GSENM object protection.

The alternatives indicate whether to close, establish a forage reserve, or reallocate vacant allotments. Under all alternatives, some allotments or pastures would be made unavailable for grazing through closure and permit cancellation, or voluntary permit or lease relinquishment. Rangeland suitability for livestock grazing on vacant allotments would be determined during development allotment management plan analysis.

Prioritizing maintenance or improvement of structural range improvements, such as fences and water developments, and nonstructural range improvements, such as seedings and mineral blocks, would improve the overall rangeland condition by protecting sensitive areas, including riparian zones, and increasing the overall livestock distribution across the landscape. Increased livestock dispersal would contribute to improved range conditions throughout each allotment by allowing previously high-use areas to recover and encouraging grazing in underutilized areas where decadent vegetation can benefit from light disturbance. Conversely, alternatives that limit structural and nonstructural range improvements may limit or reduce AUMs on allotments where it is impractical to manage livestock without maintenance and construction of range improvements.

Under all alternatives, changing livestock AUM allocations would vary by either reducing, increasing, or maintaining the availability of guaranteed forage for livestock grazing operations. Reducing available AUMs could impact grazing operations by limiting the number of, or total production of, livestock. Loss of the ability to graze livestock on BLM-managed lands would impact the ability of local ranching operations to persist. In the long term, loss of AUMs could lead to local communities' reduced economic output and reduced ranching operations continuity. While ranching operations are required to have adequate amounts of base property to support their livestock, the inability to graze livestock on BLM-managed lands would have substantial economic impacts on operations due to increased need for feed/forage. Conversely, increasing the number of AUMs has the potential to increase economic output by making more forage available for livestock. Additional economic analysis can be found in **Section 3.21**, Social and Economic Values.

All alternatives would continue to manage WSAs and ISAs under the Wilderness Act of 1964; grazing on existing active allotments within these areas would remain available. Pursuant to the nonimpairment standard, the BLM manages WSAs to prevent impairment of the suitability of such areas for preservation as wilderness, until Congress passes legislation to either designate them as part of the National Wilderness Preservation System or release them from further study or protection. Thus, WSAs and ISAs would

continue to be managed in a manner that would not impair their ability to be designated as Wilderness. Thus, in accordance with the Wilderness Act of 1964, section 4(d)(4)(2), minimum requirements for livestock grazing administration, such as motor vehicle use, would be permitted for livestock administration and range infrastructure maintenance. However, the nonimpairment standard would reduce the flexibility of allotment permit holders to use motor vehicles to gather and move livestock and create new range improvements.

Meeting minimum requirements for livestock administration in WSAs and ISAs could restrict motor vehicle use and reduce opportunities for permittees to maintain structural range developments, haul salt and minerals, and retrieve sick or injured animals. Under all alternatives, over the long term, management direction for WSAs and ISAs could improve overall range and forage condition through these designated area protections. Managing areas as ROW exclusion and closing them to OHV use would prevent impacts on livestock grazing from surface-disturbing activities, as well as negative interactions with recreationists, such as harassment of livestock by OHV use.

Inventoried lands with wilderness characteristics would be managed under all alternatives to protect, preserve, and maintain wilderness characteristics. However, these lands would not be afforded minimum requirements and nonimpairment standards like WSAs and ISAs. Therefore, livestock grazing use, including vehicle use for administrative livestock administration within active allotments, would continue under all alternatives, regardless of location within or outside lands with wilderness characteristics.

Under all alternatives, livestock grazing operations could be impacted by protecting eligible or suitable WSRs. This is because livestock grazing operations would be limited to not adversely impact or otherwise degrade each eligible or suitable WSR segment's ORVs. Limitations could include constructing new range improvements, such as water developments or fences, or mineral lick placement within eligible or suitable WSR corridors. However, existing livestock grazing practices and related structures are not affected by eligible or suitable WSR segments, because grazing is compatible with all tentative classifications (wild, scenic, and recreational). Livestock grazing may occur in an eligible or suitable WSR corridor, as long as the uses do not adversely impact the ORVs.

ROW authorizations foreseeable in areas open to ROWs or in ROW avoidance areas include, but are not limited to, construction of roads, facilities, and structures; removal or manipulation of vegetation; trampling of vegetation by overland OHV travel; and grading or excavation of the land surface. Any surface-disturbing activities within ROWs can remove or lower the quality of available forage for livestock. On a site-specific level, grazing operations could be enhanced by ROW authorizations such as road improvements or construction, as these could facilitate increased access to pastures and allotments for operators.

Generally for land allocations, the greater size of an area allocation would result in more ground-disturbing activities that are authorized, thus a greater potential impact on livestock grazing activities and forage. Activities that result in vegetation removal or natural surface feature disturbance could impact forage quality and availability, resulting in a potential loss of available AUMs. Areas that are managed as ROW exclusion would be subject to the fewest potential ground-disturbing activities and, therefore, would have the least impact on livestock grazing operations. Areas that are managed as ROW avoidance areas would have more potential for impacts on livestock grazing than ROW exclusion areas. The greatest impacts on livestock grazing would result from ground disturbance in areas that are open to ROW authorization.

While primitive and nonmotorized recreation such as hiking, mountain biking, target shooting, and dispersed camping generally have fewer impacts than motorized recreation, shared use of rangelands can result in vegetation trampling, fragmentation, and increased weed invasion, thus lowering forage quality. Additionally, user-livestock conflicts, such as not securing gates or target shooting fence posts, could impact livestock grazing operations. For example, unlocked gates or damaged fence posts could allow cattle to escape pastures and trespass onto other lands. Recent and future recreational use increases across the planning area are likely to intensify conflicts among recreationists and livestock across all alternatives.

Under all alternatives, motorized recreation in GSENM would continue at varying levels, which could affect livestock administration and forage condition. Recreational motorized vehicles could lead to conflicts with livestock and operators, as well as a reduction of forage quality and availability from crushing vegetation through trail widening or unauthorized off-trail use. Motorized recreation could directly impact livestock through vehicle collisions and stress from noise and human presence. Motorized recreation is also known to increase the spread of invasive plants, further reducing forage quality (Wolf et al. 2017). Additionally, motorized recreation without the use of proper spark arresters could lead to spark-ignited wildfires, resulting in the loss of available forage. Impacts from motorized recreation could lead to both short- and long-term impacts on vegetation, which could result in a loss of AUMs. Additionally, fugitive dust can increase the incidence of dust pneumonia in livestock and reduce forage palatability.

Primitive and nonmotorized recreation would continue at varying levels under all alternatives, which could affect livestock by reducing forage quality or affecting livestock grazing operations. The potential impacts of mismanaged or heavy nonmotorized recreation on rangelands include erosion and trail damage, increased trail footprints, trampled vegetation, and increased invasive plant spread. All these could reduce forage quality and availability over the short and long terms.

All alternatives would allow vegetation management, though the treatment methods and acres would vary by alternative, as discussed below. Over the short term, vegetation management projects, including timber harvest, mechanical thinning, and prescribed fire, would affect rangelands by removing forage and by compacting or eroding soils for one or more growing seasons, potentially up to 5 years. Pastures that have received vegetation management may need to be rested or deferred during treatments and restoration, thus removing forage availability in those areas during regrowth. However, vegetation management is generally planned with permittees to occur around grazing rotations when livestock are not present, to minimize impacts on grazing operations.

Over the long term, vegetation management would enhance forage quality and availability, potentially leading to increased forage and AUMs, as evaluated during subsequent plan amendments or implementation-level NEPA analysis. Under all alternatives, vegetation management would help move vegetation communities and fuels loading toward more desirable and resilient conditions, thereby reducing the risk of uncharacteristically large and landscape-altering wildfire. In addition, decreasing the fire risk would lower the potential for AUMs to be lost to wildfire.

All alternatives include protecting sensitive natural resources, such as restoring PFC in riparian zones. This management could affect grazing operations by altering the timing, intensity, and availability of permitted grazing, thereby limiting livestock numbers and season of use authorized to grazing operators. Over the long term, additional protections of sensitive natural resources could lead to more sustainable vegetation conditions, which could increase forage availability for livestock.

Alternative A

Under Alternative A, nearly all allotments would be available for livestock grazing, and all currently suspended AUMs would be activated over time through new allotment management plans or site-specific NEPA analysis (**Table 3-85**). Assessments would be conducted to determine the available AUMs on suspended pastures or allotments. Activating additional AUMs would increase the forage available for livestock grazing operations.

Table 3-85. Livestock Grazing Availability and AUM Allocations by Alternative

Livestock Grazing	Alternative A	Alternative B	Alternative C	Alternative D
Acres available for livestock grazing	2,116,200	2,037,700	1,927,300	1,150,000
Acres unavailable for livestock grazing	125,800	,204,300	314,700	1,092,000
AUMs allocated for livestock grazing	107,995	105,034	95,406	45,248

Source: BLM GIS 2022

The goals and objectives under Alternative A would maintain, restore, and enhance the overall condition of rangeland ecosystems based on standards not being met, as stated in **Table 3-84**. Adaptive management of livestock grazing permit terms and conditions would lead to short-term changes in livestock administration, including changes to season of use, duration of use, and forage allocations, to promote BLM Utah Rangeland Health Standards. Over the short term, changes to permit terms and conditions could limit the forage available for livestock grazing operations. However, improving overall rangeland condition through actions such as maintenance or restoration of nonstructural (seedings) and structural range improvements would lead to greater rangeland health and could lead to increased available AUMs over the long term.

All existing WSAs and ISAs would remain; impacts on livestock grazing in these areas would be as described under Impacts Common to All Alternatives. WSAs or ISAs released from wilderness consideration would be managed in accordance with the goals, objectives, and management prescriptions for rangelands under the RMP and would not receive nonimpairment standard protections, thus livestock grazing operations would be afforded increased flexibility with regard to motorized vehicle use and maintenance or construction of range improvements.

Lands with wilderness characteristics would not be managed to protect those characteristics (**Table 3-86**), so there would be no impact on forage or livestock grazing operations in those units.

Table 3-86. Acres Available for Livestock Grazing within Lands with Wilderness Characteristics

Management Type	Alternative A	Alternative B	Alternative C	Alternative D
Lands managed to protect wilderness characteristics	0	65,900	181,900	327,900
Lands managed for discretionary use while not protecting lands with wilderness characteristics	553,000	466,700	2,500	0

Source: BLM GIS 2022

Management under Alternative A would maintain existing land management practices and acreages for ROWs; impacts would be as described under *Impacts Common to All Alternatives*.

Alternative A would manage the most acres of ERMA of all alternatives and the fewest acres of SRMAs. ERMAs are generally less restrictive of recreation activities than SRMA, as recreation is typically more distributed in ERMAs than in SRMAs. Recreation activities under Alternative A would have the potential to impact livestock grazing in terms of potential conflicts between livestock and recreationists, as well as direct impacts on forage vegetation from recreation activities.

OHV travel on designated routes would continue to be allowed in the majority of GSENM. OHV travel and recreation use is expected to continue creating vegetation damage, trail widening, and user conflicts with livestock.

Prioritization of rangeland health using the full suite of vegetation management methods would remove forage over the short term, but could improve overall forage quality and quantity and rangeland condition over the long term. Optimizing rangeland health could create conditions that would improve forage productivity. Rangeland vegetation would continue trending toward conversion to pinyon-juniper woodland, with increased invasion of invasive annual grasses, such as cheatgrass. These conditions would lead to vegetation conditions that are less resistant to and resilient from wildfire, and the potential for forage loss from wildfire would increase.

Alternative B

The goals and objectives under Alternative B focus on landscape-scale restoration projects and would increase rangeland resiliency to drought and wildfire. This could lead to overall rangeland condition improvement in the decision area, compared with Alternative A.

Alternative B would make unavailable or close approximately 100,000 additional acres of allotments than under Alternative A, which is almost double that under Alternative A (**Table 3-85**). Managing fewer acres as available for livestock grazing would decrease the forage available for livestock grazing operations by 2,961 AUMs.

Impacts on livestock grazing from WSA and ISA management under Alternative B would be the same as those described under Alternative A. Under Alternative B, WSAs or ISAs released from wilderness consideration would continue to be managed in accordance with past management prescriptions and would continue to receive nonimpairment standard protections, consistent with the protection of GSENM objects, until a new wilderness inventory has taken place to establish new management prescriptions. In these areas, livestock grazing operations would be not afforded increased flexibility unless a wilderness inventory has taken place within the released WSA or ISA.

Alternative B would designate the Fiftymile Mountain RNA (ACEC), which is approximately 56,800 acres and overlaps an active grazing allotment. The permittee would be required to develop a plan with the BLM to identify potential impacts and include adaptive management thresholds in the applicable allotment management plan. Grazing permit terms and conditions would change based on monitoring that revealed adverse impacts.

Alternative B would manage to protect 65,900 acres of lands with wilderness characteristics that overlap with active grazing allotments (**Table 3-86**). Management to protect lands with wilderness characteristics

could benefit forage quality and quantity by prohibiting some surface-disturbing activities. No management associated with protecting lands with wilderness characteristics under Alternative B would reduce forage availability or inhibit livestock grazing operation administration.

Impacts on livestock grazing from managing areas as ROW exclusion under Alternative B would be similar to those described under Alternative A; types of impacts would be as described under *Impacts Common to All Alternatives*. However, the number of acres open to ROW authorization would be 87 percent less under Alternative B (85,100 acres) than under Alternative A (630,400 acres). Restrictions on ROW development in these areas would have greater benefits on forage availability over the long term where allotments overlap with acres previously open to ROW authorization; therefore, impacts from potential development would be greatly reduced under Alternative B.

Alternative B would manage slightly fewer acres as ERMAs than Alternative A and would slightly increase acres of SRMAs. Impacts on livestock grazing would be similar to those described under Alternative A. However, because more SRMAs would be designated, the potential for recreation in these areas to impact livestock grazing in terms of potential conflicts between livestock and recreationists, as well as direct impacts on forage vegetation from recreation activities, would be increased.

Compared with Alternative A, Alternative B would reduce available OHV areas by closing WSAs/ISAs, lands with wilderness characteristics identified for protection, and No Mans Mesa RNA (ACEC), totaling approximately 953,100 acres. Alternative B would close an additional 950,300 acres, compared with Alternative A, and would reduce impacts on livestock from user-related conflicts and forage trampling or removal. However, closure of OHV roads could reduce permittees' access to livestock and range improvements.

Vegetation management under Alternative B would focus on landscape-scale restoration projects, such as seedings, to increase vegetation community climate resiliency. This would help maintain forage extent and quality in the long term. Vegetation restoration would move rangeland health toward desired conditions to a greater extent than under Alternative A by increasing forage quality and resiliency on a larger scale. Because vegetation removal and restoration-associated surface disturbance would occur over a larger area under Alternative B than under Alternative A, short-term impacts on forage quality and quantity may occur on a larger scale than under Alternative A.

Alternative B would require that land health assessments be complemented within 2 years of the signing of the ROD, including causal factor determinations, across eight watersheds identified in **Chapter 2**. This could impact livestock grazing operations through changed permit terms and conditions, including forage allocations, depending on causal factor determinations. Identification of causal factor determinations by conducting land health assessments within these watersheds would lead to improved forage conditions within overlapping allotments over the long term, as management actions would be taken to fulfil the appropriate land health standards.

New discretionary actions would be avoided within a 330-foot buffer of riparian and wetland areas, unless the action would result in no net loss of riparian or wetland resources, which could result in site-specific impacts on livestock grazing operations.

Alternative C

The goals and objectives under Alternative C focus on protecting existing landscapes while allowing for management of discretionary uses, such as livestock grazing, consistent with protecting GSENM objects.

Alternative C would manage nearly 3 times as many acres as unavailable for livestock grazing than Alternative A (315,000 acres and 125,800 acres, respectively; **Table 3-85**). Reducing areas available for livestock grazing would decrease available forage under Alternative C by 12 percent, compared with Alternative A.

Livestock grazing under Alternative C would be managed in a manner that is consistent with the protection of GSENM objects. Allotments that are not currently under permit would be made unavailable for livestock grazing. Additionally, pastures and allotments fully within Glen Canyon would be made unavailable for livestock grazing, primarily due to conflicts between recreational users and livestock; however, closures would also occur for the protection of riparian and upland vegetation, as well as cultural resources. AUMs would be reduced to only those under permit.

Similar to Alternative B, Alternative C would require land health assessments within 2 years on allotments within watersheds that have shown a substantial departure from historical conditions. Changes in grazing terms and conditions would be made if livestock are determined to be the causal factor according to the results of the land health assessments and determinations; impacts from changes to terms and conditions would be as described under *Impacts Common to All Alternatives*. Additionally, no new structural range improvements would be permitted until a land health assessment and determination is completed for the allotment, unless the improvement would exclude livestock from an area or provide protection of GSENM objects. Seedings and other nonstructural range improvements with a primary purpose of increasing forage for livestock would not be permitted under Alternative C.

Impacts on livestock grazing from WSA and ISA management under Alternative C would be the same as those described under Alternative A. If WSAs were released from wilderness consideration, impacts on livestock grazing would be the same as those described under Alternative B. Impacts of designating the Fiftymile Mountain RNA (ACEC) under Alternative C would be the same as those described under Alternative B.

Alternative C would manage for the protection of approximately 181,900 acres of lands with wilderness characteristics that overlap with active grazing allotments (**Table 3-86**). Protection of lands with wilderness characteristics would benefit forage by preventing surface disturbance as described under *Impacts Common to All Alternatives*.

Alternative C would increase the acres of ROW exclusion and avoidance areas by approximately 307,300 acres and 313,800 acres, respectively, compared with Alternative A; types of impacts on livestock grazing from restricting ROW development would be as described under *Impacts Common to All Alternatives*. Acres open to ROW authorization would be 98 percent less under Alternative C (10,900 acres) than under Alternative A (630,400 acres).

Compared with Alternative A, Alternative C would manage 6 times more acres of SRMAs and less than one-third the acres of ERMAs. Because SRMAs tend to concentrate recreational uses more so than ERMAs, there would be higher potential for impacts on livestock from recreation conflicts under Alternative C than under Alternatives A and B.

Alternative C would reduce available OHV areas from Alternative A and would have similar impacts as those described under Alternative B. Closing 431 times more acres (1,210,100 acres) to OHV use under Alternative C than under Alternative A would reduce impacts on livestock from user-related conflicts and forage trampling or removal.

Vegetation management under Alternative C would focus on area management of existing high-quality native vegetation. Restoration with native species would be prioritized; however, nonnative species may be used in phased restoration efforts that lead towards a native vegetation community. Opportunities for seedings with nonnative forage would be similar to those described under Alternative B but would be reduced under Alternative C. Other impacts on livestock grazing under this alternative would be like those described under Alternative B, though there may be fewer opportunities to return degraded forage to desired conditions without widespread restoration activities. However, when compared with Alternative A, there would be more opportunities to increase rangeland health with native restoration under Alternative C.

Alternative C also includes the same management direction to complete rangeland health assessments and causal determinations as under Alternative B and impacts would be as described under Alternative B.

Alternative D

Alternative D would maximize native processes through limiting all discretionary uses, including livestock grazing. Passive management of rangelands would be the primary approach under this alternative.

Alternative D would manage the most acres as unavailable for livestock grazing of all the alternatives. This alternative would reduce areas available for livestock grazing by 46 percent (966,200 acres), compared with Alternative A (**Table 3-85**). Alternative D would reduce the number of AUMs available across the planning area by more than 50 percent when compared with all other alternatives and by 62,700 AUMs (58 percent) from Alternative A.

Like Alternative C, under Alternative D, allotments that are not currently under permit would be made unavailable for livestock grazing. Allotments that are both in GSENM and Glen Canyon with pastures or allotments fully within Glen Canyon would be managed as unavailable for livestock grazing, primarily due to conflicts between recreational users and livestock; however, closures would also take place for the protection of riparian and upland vegetation, as well as cultural resources. Additionally, some allotments within departed watersheds would be unavailable. The BLM would conduct rangeland health assessments and fully processed permit renewals within 10 years on allotments. Like Alternative C, new structural range improvements would not be permitted until a land health assessment and determination is completed for the allotment, unless the improvement would exclude livestock from an area or protect GSENM objects. Also like Alternative C, seedings and other nonstructural range improvements with a primary purpose of increasing livestock forage would not be permitted under Alternative D.

Impacts on livestock grazing from WSA and ISA management under Alternative D would be the same as those described under Alternative A. If WSAs were released from wilderness consideration, they would continue to be managed in accordance with past management prescriptions and would continue to receive nonimpairment standard protections, consistent with the protection of GSENM objects, until a new wilderness inventory establishes new management prescriptions. In these areas, livestock grazing

operations would be not afforded increased flexibility, unless a wilderness inventory has occurred within the released WSA or ISA.

Alternative D would manage for the protection of approximately 327,900 acres of lands with wilderness characteristics that overlap with active grazing allotments (**Table 3-86**). Protection of lands with wilderness characteristics would benefit forage by preventing surface disturbance as described under Impacts Common to All Alternatives.

Alternative D would manage 92 percent more acres as ROW exclusion areas than Alternative A (1,693,700 acres and 881,300 acres, respectively). Types of impacts on livestock grazing from restricting ROW development would be as described under *Impacts Common to All Alternatives*.

Alternative D would manage less acreage of SRMAs than Alternative C and 2 times more acres than Alternative A. Approximately 14 percent the acreage of ERMA would be designated under Alternative D, compared with Alternative A. Because SRMAs are more restrictive of recreational uses than ERMAs, there would be fewer impacts on livestock from recreation conflicts under Alternative D than under Alternative A.

Alternative D would designate more lands as closed to OHV use than any other alternative. Closing an additional 1,636,000 (585 times more) acres to OHV use under Alternative D, compared with Alternative A, would reduce impacts on livestock from user-related conflicts and forage trampling or removal.

Vegetation management under Alternative D would focus on widespread vegetation restoration while prioritizing natural techniques for land health recovery. Like Alternative C, opportunities for seedings with nonnative forage would be reduced under this alternative compared with Alternatives A. Prioritizing natural processes and reducing opportunities to use nonnative forage species under this alternative could lead to an increase in invasive annual grasses over the long term, as some nonnative species may help to inhibit the growth of invasive annuals. Other impacts on livestock grazing under this alternative would be like those described under Alternative B. However, when compared with Alternative A, there would be more opportunities to improve rangeland health with native restoration.

This alternative also includes the same management direction to complete rangeland health assessments and causal determinations as under Alternatives B, and impacts would be as described under Alternative B.

Cumulative Impacts

The cumulative impacts analysis area for livestock grazing includes allotments within the planning area. The area includes allotments and pasture areas that could be directly affected by management decisions and lands that could also experience impacts due to management decisions in the planning area, such as base property. The timeframe for the cumulative effects analysis is the life of the plan.

Cumulative impacts may result from activities on adjacent BLM-managed lands and national recreation areas, and in adjacent communities and from other resource use activities. Past, present, and reasonably foreseeable range improvement projects in the analysis area could contribute to cumulative impacts on livestock grazing in the cumulative effects analysis area. Livestock grazing management is broadly consistent across federal land ownership due to adherence with current federal law, regulation, and policy, including

adherence to the BLM Utah Standards and Guidelines for Rangeland Health. This means broad movement toward desired conditions would be facilitated across administrative boundaries in this region.

The cumulative impacts of past and present actions on livestock grazing management in the planning area are captured in the description of the affected environment. These past and existing rangeland management projects include the development or repair of water developments and pipelines, including the Rangeland Wells and Pipelines project, GSENM Water Catchment project, and the Stair Canyon pipeline replacement project (**Appendix F**, Analytical Framework). In general, these projects would contribute to improving livestock grazing facilities and meeting BLM Utah Standards and Guidelines for Rangeland Health. Other relevant activities include ongoing and anticipated future increases in recreational activities, as recreation can potentially conflict with continued livestock grazing for the reasons discussed in *Impacts Common to All Alternatives*.

Proposed livestock grazing under all alternatives would have similar contributions to cumulative effects on rangeland condition in the planning area, as all alternatives would manage for the protection of GSENM objects, and in adherence to BLM Utah Standards and Guidelines for Rangeland Health. Proposed livestock grazing management under Alternative C would make a relatively high number of acres available to livestock grazing, while managing a relatively low number of acres of RMAs. As a result, the potential for recreation-livestock conflicts may be fewest under this alternative, and so this alternative would have the lowest contribution to cumulative effects in this respect.

3.16.3 References

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3.17 RECREATION

3.17.1 Affected Environment

Current Conditions

GSENM is situated in the middle of five national parks: Arches, Bryce Canyon, Canyonlands, Capitol Reef, and Zion. Visitation numbers at Zion National Park have more than doubled since 2007, from 2,657,281 to 5,039,835 in 2021. Visitor numbers at Bryce Canyon National Park increased from 1,012,563 in 2007 to 2,104,600 in 2021, an increase of approximately 108 percent (NPS 2022). In Capitol Reef National Park, just east of the decision area, visitation numbers increased by 153 percent during the same period.

The BLM reports recreation visitation estimates using the Recreation Management Information System, which is an internal database. The system estimates participation in 65 types of recreational activities recorded at BLM sites and areas based on registrations, permit records, observations, and professional judgment. Visitation is estimated by the number of visitors and visitor days. Visitors are the actual number of people who take part in a recreational activity. A visitor day is a common recreation unit of measure used among federal agencies that represents an aggregate of 12 visitor hours at a single site or area. Visitor days at GSENM have increased from 742,586 in 2010, to 1,371,036 in 2021, and to 2,110,948 in 2022 (BLM 2022a, 2023; BLM GIS 2022).

Recreation levels in the planning area have been monitored for many years; however, recorded visitor numbers are only a representation of the actual level of recreation use. This can be attributed to multiple access points, lack of permit compliance, and the BLM's inability to count visitation in every location. Many areas lack direct visitation monitoring facilities such as traffic counters or visitor registers. Direct monitoring by BLM personnel is focused on areas of highest use or conflict. Discrepancies in actual use are also a result of the remote nature of much of the planning area that does not receive frequent monitoring. In addition, many popular use areas and trails are not designated or developed sites, and there is currently no way to accurately determine the actual amount of recreational use these areas receive. Known types of recreational use in GSENM include hiking, camping, backpacking, bikepacking, ATV and UTV riding, automobile touring, equestrian activities, canyoneering, rock climbing, wildlife viewing, photography, and hunting. ATV and UTV use has become one of the fastest-growing recreational activities.

Recreation Management Areas

RMAs are the BLM's land use planning-level tool for managing recreational use of the BLM-managed lands. BLM-managed lands are identified for recreation as a SRMA or an ERMA. All lands that are not designated as either a SRMA or ERMA are considered BLM-managed lands not designated as RMAs, or non-RMA lands.

SRMAs recognize unique and distinctive recreation values; those values are managed to enhance a targeted set of activities, experiences, benefits, and recreational setting characteristics, which become the priority management focus. These areas often have high levels of recreation or valuable natural resources. ERMAs recognize existing recreational use, demand, or recreation and visitor services program investments. They are managed commensurate with other resources and resource uses to sustain the ERMA's principal recreational activities and associated qualities and conditions.

An RMA may be subdivided into RMZ to further delineate specific recreational opportunities. SRMAs may be subdivided into RMZs with discrete objectives. SRMA/RMZ objectives must define the specific recreational opportunities (that is, activities, experiences, and benefits derived from those experiences) that become the focus of recreation and visitor services management. ERMAs may be subdivided into RMZs to ensure recreation and visitor services are managed commensurate with the management of other resources and resource uses.

For non-RMA lands, the BLM manages the lands to meet basic recreation and visitor services and resource stewardship needs. Recreation is not emphasized on these lands; however, recreational activities and related management may occur, except on those lands closed to public use. Recreation and visitor services are managed to allow recreational uses that are not in conflict with the primary uses of these lands.

Currently, the BLM manages five SRMAs and two ERMAs in GSENM. These areas are shown in **Figure 3-45** (Recreation Management Areas, 2020 Management Plan) in **Appendix A**.

Special Recreation Management Areas

- Burr Trail (6,600 acres), including the Deer Creek RMZ (600 acres) and the Gulch RMZ (100 acres)
- Calf Creek (7,000 acres)
- Hole-in-the-Rock Road (32,300 acres), including the Dance Hall Rock RMZ (600 acres), Dry Fork Wash RMZ (1,200 acres), Devil's Garden RMZ (600 acres), 20-Mile Dinosaur Tracks RMZ (300 acres), and Egypt Slot Canyons RMZ (6,200 acres)
- Skutumpah (1,500 acres)
- Paria Canyon Vermilion Cliffs (30,000 acres)

Extensive Recreation Management Areas

- GSENM (991,500 acres), including the Cottonwood Road RMZ (2,200 acres)
- KEPA (814,000 acres), including the Little Desert RMZ (2,500 acres) and the Cottonwood Road RMZ (3,100 acres)

Developed Recreation Sites

Developed recreation sites are areas that incorporate visitor use with infrastructure such as roads, parking areas, and facilities that protect the resource and support recreation users in their pursuit of activities, experiences, and benefits. Examples of these sites are listed in **Table 3-87**. Visitor-use infrastructure is a management tool that can minimize impacts on resources, concentrate use, and reduce visitor conflicts. Developed recreation sites help accomplish these goals.

Table 3-87. Current Day Use Sites and Trailheads by Unit

RMA*	Day Use Site or Contact Station	Campground	Trailhead	Point of Interest
Escalante Canyons	Calf Creek Recreation Area	Calf Creek Deer Creek	Boulder Mail Calf Creek Lower and Upper Falls Cedar Wash Dinosaur Track Site Dry Fork Coyote Gulch Early Weed Egypt Escalante River Escalante Town Forty Mile Harris Wash Horse Canyon Hurricane Wash Little Death Hollow Red Well The Gulch Wolverine	Dance Hall Rock Devil's Garden ONA/Instant Study Areas (ISAs)
Highway 12 Corridor	Cannonville Visitor Center Escalante Visitor Center		Henderson Canyon Escalante River Escalante Town	Highway 12 Blues Overlook Highway 12 Boynton Overlook Highway 12 Fremont Granary Highway 12 Head of the Rocks Highway 12 Hogback Highway 12 Hole-in-the-Rock
Highway 89 Corridor	Big Water Visitor Center Kanab Visitor Center		Toad Stools	
GSENM Extensive	Croton Road Death Ridge Four Mile Bench Smoky Mountain			
Paria Canyons and Plateaus	Buckskin Mountain			

RMA*	Day Use Site or Contact Station	Campground	Trailhead	Point of Interest
Paria/Hackberry	Bull Valley Gorge Kitchen Corral Nephi Pasture Pahreah Old Town Site Paria Contact Station Paria Movie Set Rock Springs Bench		Cottonwood Narrows Lick Wash Lower Hackberry Round Valley Draw Sheep Creek/Upper Paria Willis Creek	Grosvenor Arch

Sources: BLM 2000, 2022a

*RMAs reflect the 2000 MMP (BLM 2000)

Commercial, Competitive, and Organized Group Recreation

As authorized by 43 CFR Subpart 2932, Federal Lands Recreation Enhancement Act, and FLPMA, there are five types of uses for which SRPs are required: commercial, competitive, vending, individual or group use in special areas, and organized group activity and event use. SRPs are issued to outfitters, guides, vendors, recreation clubs, and commercial competitive event organizers that provide recreational opportunities or services without using permanent facilities. The permits are issued to manage visitor use, protect natural and cultural resources, and accommodate commercial recreational uses. The BLM issues SRPs for noncommercial use in certain areas where a permit system for individual use would achieve management objectives. Large, noncommercial group activities outside developed campgrounds could require a SRP, if necessary, to meet planned resource management objectives or resource conditions. If the group or activity does not warrant an SRP, a letter of agreement is often used.

Commercial guiding activities often offer a specialized opportunity for the recreating public to experience activities that they themselves do not have the skills, equipment, or resource knowledge to experience independently. Some recreational use can be estimated through recreational activities requiring special permits. **Table 3-88** lists the numbers and types of SRPs (Recreation Management Information System data). Demand for SRPs has been increasing in the planning area. In 2021, the BLM issued 144 permits for activities including hiking, backpacking, vehicle and OHV tours, shuttle services, horseback riding, pack stock services, canyoneering, historical and educational programs, photography workshops, bicycle tours, outfitter-led hunting, therapeutic youth programs, and vending services.

ATV/UTV use has become a substantial component of recreational use. This increase is due to growing ATV/UTV popularity, changes in demographics, increased commercial availability (purchase and rental opportunities), and marketing of multi-passenger ATVs/UTVs. The Nephi Pasture region is a popular ATV/UTV recreation destination. Some locations receive unmanaged, intensive ATV/UTV use based on landscape characteristics and easy access from local communities.

Table 3-88. Special Recreation Permits

Recreational Activity	Current Permits
Art festival	1
ATV jamboree	2
Canyoneering	6
Cycling	6
Glamping	1

Recreational Activity	Current Permits
Hiking/backpacking	41
Horseback riding	9
Hunting	25
Llama pack trips	2
Outdoor education	20
Photography tours	8
OHV/vehicle/sightseeing tours	19
Vending (Calf Creek firewood)	1
Wilderness therapy	1
Total Permits	142

Source: BLM 2022b

Trends

Recreational use is increasing throughout southwestern Utah, including GSENM. As this occurs, conflicts between recreation and other uses, such as grazing, are also increasing. Recreation specifically conflicts with rangeland resources when camping occurs adjacent to range facilities, including corrals, gates, and water troughs. While camping stays are usually limited to 14 days throughout GSENM, there is an increasing issue with visitors camping far beyond this limit, which can result in user conflicts or impacts on other resources.

Recreational target shooting occurs within GSENM, but trends are largely unknown. Encounters with this activity are rare. With the expected rise in visitation, conflicts between recreational target shooting and other recreational uses would also increase.

Increased visitor use also creates more challenges for law enforcement. Graffiti, inadvertent damage, and vandalism are issues, particularly around cultural sites. For example, the BLM prohibits camping, fires, and climbing in alcoves (BLM 2020a); however, this is difficult to enforce due to the large number of alcoves in GSENM and limited law enforcement personnel.

The Little Desert OHV open area (100 acres, or 0.005 percent of GSENM) is open to cross-country OHV travel. There is concern about the impacts of cross-country OHV travel on natural sources in the area, including native vegetation. In 2022, the BLM published a notice requesting that the public voluntarily remain on existing routes within the Little Desert OHV area (BLM 2022c). These adverse impacts of cross-country OHV travel on natural resources could be considered inconsistent with the protection of GSENM's objects, such as paleontological and cultural resources.

Mountain biking and e-bike use is becoming increasingly popular in GSENM—and in the southwest Utah region in general. This presents a need for GSENM management to consider additional trails designated for mountain bike and/or e-bike use. Proclamation 10286 does not address e-biking in GSENM.

In the planning area, an example of the growth in tourism and recreation is the request for SRPs for commercial services and events. Applications for SRPs to conduct commercial services on BLM-managed lands has increased almost 2.3 times over the past 17 years; these activities are anticipated to increase in the future as the public continues to spend more time on BLM-managed lands. In the last few years, the BLM has received SRP applications to authorize bike tours and races, photography workshops, running races, OHV events, and historical and cultural events. The BLM will likely receive more permit applications

for similar and other activities in the future. These events generally receive regionwide publicity, with event organizers seeking out-of-area distribution and participation.

The popularity of drones has increased in recent years as most have become more affordable to the public. Drones are banned in several national monuments and state parks and are temporarily banned in national parks due to safety and noise issues and impacts on wildlife. Proclamation 10286 does not address drone use in GSENM. The launching and landing of drones (or unmanned aircraft systems) are managed as motorized OHVs per Manual 1626.

Forecasts

Recreation use in the planning area is expected to increase due to the overall growing trend of people seeking BLM-managed lands and the opportunities these lands provide. Without active management, natural resource conditions and the quality of the recreational experience would decline with increased recreational use.

Several factors contribute to the anticipated increase in use, including the following:

- Marketing of travel and tourism to southern Utah
- Displacement from national parks due to overcrowding
- Increasing leisure time and disposable income for the working population
- An increasingly active retired population with more disposable income
- An increase in Utah's population
- Rapidly evolving forms of recreation and new vehicles and gear for pursuing recreational activities
- A focus on the importance of natural resource-based recreation among the increasingly urbanized population
- The increasing importance of recreation as a component of the local and regional economic base, surpassing traditional industries in many areas
- The increasing popularity of outdoor recreation as a family-oriented activity

Recreation Management Areas

SRMA, ERMA, and non-RMA boundaries require reevaluation based on updated GSENM boundaries and as required by FLPMA section 201, U.S. Department of the Interior policy 600 Departmental Manual 5, and by BLM Handbooks H-8320-1 and H-9600-1.

All-terrain Vehicle and Utility-task Vehicle Use

ATV/UTV recreation is expected to intensify in high-demand areas and adjacent to communities. Most recreational activities in GSENM occur primarily during spring, summer, and fall. However, there has been a steady increase in winter recreation, particularly in Nephi Pasture, where local communities are utilizing ATVs/UTVs. Existing management efforts and processes, which were developed to address ATV recreation levels and vehicle type for 20 years ago, are often inadequate. ATV and newer UTV recreation in some areas is expected to continue to involve resource and road impacts, as well as user conflicts.

Mountain Bike Use

There are many parts of the GSENM that provide good opportunities for the cyclist, including mountain bike and/or e-bike users, to enjoy the scenic and rugged landscapes. Most use occurs on transportation system routes, and there are no routes specifically designated for cycling use.

3.17.2 Environmental Consequences

Refer to **Section F.22**, Recreation, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management affect the BLM's ability to provide recreational opportunities and infrastructure while protecting GSENM objects of historical and scientific interest?

Impacts Common to All Alternatives

Management for forestry and woodland products, lands and realty, livestock grazing and range improvements, transportation and access, vegetation, and fire and fuels may result in direct adverse impacts on recreational opportunities and experiences. Development and management of these resources and resource uses may create health and safety concerns for the recreational user, such as noise, dust, and vehicle conflicts; adverse effects on recreational experiences through damage to recreational settings and perceptions of naturalness; and reduced or restricted access to recreation areas. Changes to the landscape that can be seen from popular recreation sites, trails, or auto-touring drives (for example, Highway 12) could affect the recreational setting and the potential to realize certain recreational experiences.

Management of special designations, cultural resources, paleontology, visual resources, fish and wildlife, and other resources has the potential to both adversely and beneficially affect recreation. Management to preserve and enhance fish and wildlife habitat is generally supportive of protecting recreational opportunities and experiences through preservation of the natural setting and maintenance of healthy wildlife populations for hunting and wildlife viewing. Conversely, fish and wildlife management can restrict the season of use or recreational opportunities available at a given location, such as restricting seasonal access to big game seasonal habitats, limiting OHV access, and closing climbing routes on cliffs with nesting raptors. Similar to fish and wildlife management, measures to protect soil and water and visual resources, as well as creating special designations, can be both adverse and beneficial to recreational opportunities and experiences. Where these measures limit changes to the natural setting, they can benefit primitive recreation experiences where such settings are important. For example, WSAs are managed and maintained to provide for unique recreational opportunities in a primitive setting by limiting development. Designating SRMAs and RMZs, and, to a lesser extent, ERMAs, would have long-term beneficial effects on the management and protection of specific recreational opportunities and experiences. SRMAs and RMZs set distinct recreation management strategies for identified values and characteristics at discrete locations, resulting in beneficial impacts on recreational use. Recreation planning across BLM-managed surface lands has shifted to an outcomes-focused management framework. Each SRMA and RMZ has specific measurable outcomes, focused objectives, and associated management actions that provide a beneficial impact by guiding the amounts and types of uses allowed. ERMA management is commensurate and considered in context with the management of other resources and resource uses. RMZs, which can be included as discrete units within a SRMA or ERMA, have a distinctive recreation character, provide opportunities for a different experience and benefit outcome, and require a different set of management actions.

The RMA frameworks have been developed for each SRMA, ERMA, and RMZ (**Appendix E**, Recreation Management Areas). These frameworks identify the key elements of the proposed RMAs, including targeted recreation activities, experiences, benefits, outcomes, allowable use activities, and management actions associated with each area. Impacts would vary depending on the number and size of the RMAs.

Under all alternatives, the BLM would continue to manage the No Mans Mesa RNA (ACEC) as closed to OHV use, in part because on-the-ground OHV use is not feasible.

Alternative A

Impacts from Designation of Recreation Management Areas

Under Alternative A, the BLM would continue to manage 67,600 acres as five SRMAs and 1,797,700 acres as two ERMAs. The BLM would continue to manage 17,400 acres as 10 RMZs. These RMAs would cover the entirety of GSENM and are depicted in **Figure 2-18, Appendix A**. These RMAs would be managed in accordance with the RMA frameworks developed in Appendix R, Recreation Management Areas, of the 2020 GSENM Approved RMP and 2020 KEPA Approved RMP. These frameworks identify the key elements of the RMAs, including targeted recreation activities, experiences, benefits, outcomes, allowable use activities, and management actions associated with each area.

Of all alternatives, Alternative A includes the greatest portion of the planning area as ERMAs. Unlike SRMAs, ERMAs do not include specific measurable recreation outcomes and, therefore, their management is generally less prescriptive on allowable recreation activities, experiences, and associated management and allocation decisions. Because they can be less prescriptive, ERMAs can provide greater management flexibility to adapt to changes in recreational use and facility/infrastructure needs. However, should visitation continue to increase as anticipated, managing large portions of the planning area as ERMAs could limit the BLM's ability to allocate funding and resources to address issues. Less specific recreation management under Alternative A would do less to reduce adverse effects from recreation on other resources than would alternatives with fewer acres of ERMAs. In the long term, less specific management could damage recreational settings and result in long-term adverse effects on recreational experiences. However, less specific management could provide additional management flexibility.

Impacts from Recreational Target Shooting

Under Alternative A, recreational target shooting would continue to be prohibited within a 0.25-mile buffer around residences, campgrounds, and developed recreation facilities, which includes 8,800 acres (**Figure 2-22, Appendix A**). The buffer distance may be increased depending on area-specific conditions. These restrictions would not pertain to the lawful pursuit of game. Opportunities for recreational target shooting would continue throughout the rest of GSENM (1,856,800 acres). This would continue to result in the potential displacement of recreationists seeking opportunities for hiking, camping, sightseeing, and other activities due to noise and public safety risks associated with recreational target shooting. This could also continue to result in conflicts with other recreational users in GSENM. Alternative A would benefit the shooting sports community the most of all alternatives because it would manage the most area as open to recreational target shooting.

Impacts from Off-highway Vehicle Travel

Under Alternative A, the BLM would continue to manage 2,800 acres as closed to OHV travel in No Mans Mesa RNA (ACEC), which would prevent opportunities for motorized recreation in this area. Cross-country OHV travel would continue to be allowed in 100 acres in the Little Desert RMZ. Of all

alternatives, this would provide the greatest benefits for users seeking OHV opportunities because it would provide unique cross-country OHV opportunities in OHV open areas. This could reduce unauthorized off-trail travel in areas where OHV use is limited or closed. This would also continue to result in damage to paleontological and cultural resources that could be considered inconsistent with the protection of GSENM's objects. OHV travel on designated routes would continue to be allowed on the remaining 1,862,700 acres in GSENM (**Figure 2-26, Appendix A**). Alternative A would provide the greatest recreational access of all alternatives because it includes one OHV open area and the fewest acres of OHV closed areas. ATV and newer UTV recreation in some areas is expected to continue to involve resource and road damage and user conflicts. Because Alternative A would manage the greatest mileage of motorized routes (**Figure 3-46, Appendix A**), this would reduce conflicts between motorized recreationists.

Impacts from Other Recreational Uses and Facilities

Pedestrian use would continue to be allowed throughout GSENM under Alternative A. Opportunities for pedestrian uses in GSENM would therefore continue to be widespread, though experiences would continue to be affected by conflicting recreational uses, such as OHV travel and recreational target shooting. There would continue to be a need for GSENM management to consider designating additional trails for mountain bike and/or e-bike use.

While the 2020 Approved RMPs do not expressly speak to recreational facilities, under Alternative A there would continue to be few restrictions outside of WSAs on where development could occur. In general, the establishment of additional recreational infrastructure would enhance certain types of recreational opportunities and provide for improved public health and safety.

Alternative B

Impacts from Designation of Recreation Management Areas

Under Alternative B, the BLM would manage 95,300 acres as six SRMAs. This is greater than but similar to the acreage managed as SRMAs under Alternative A; therefore, impacts on recreation related to SRMA management would be similar to those described under Alternative A. The BLM would manage 1,770,100 acres as eight ERMAs. This is slightly fewer than but similar to the acreage managed as ERMAs under Alternative A; therefore, impacts on recreation related to ERMA management would be similar to those described under Alternative A. The BLM would manage 3,300 acres as three RMZs. Similar to Alternative A, these RMAs would cover the entirety of GSENM. Overall, impacts on recreation from designation of RMAs under Alternative B would be similar to Alternative A, with slightly different recreation decisions associated with the different SRMA/ERMA/RMZ designations.

Impacts from Recreational Target Shooting

Under Alternative B, recreational target shooting would be prohibited across 973,100 acres, which includes RNAs (ACECs) and SRMAs and a 0.25-mile buffer around residences, as well as prohibited from, on, or across routes, campgrounds, developed recreation sites and trails, and designated camping areas. These restrictions would not pertain to the lawful pursuit of game. This would reduce the displacement of and potential for conflicts with other recreational users in GSENM compared with Alternative A; however, these conflicts could still exist where recreational target shooting is allowed. Alternative B would limit access for recreational target shooting compared with Alternative A because it would close more acreage to recreational target shooting.

Impacts from Off-highway Vehicle Travel

Under Alternative B, the BLM would manage 953,100 acres as closed to OHV travel in WSAs and ISAs, lands with wilderness characteristics identified for protection within WSAs, and No Mans Mesa RNA (ACEC), which would prevent opportunities for motorized recreation in these areas. This would not change the miles of routes closed to motorized use, compared with Alternative A; however, official route closures are implementation-level decisions that would be analyzed in a travel management planning process (**Figure 3-47, Appendix A**). Under Alternative B, the ability to recreate away from motorized routes would be greater than under Alternative A. OHV travel on designated routes would continue to be allowed on the remaining 912,500 acres in GSENM (**Figure 2-27, Appendix A**). This would limit resource damage from cross-country OHV travel compared with Alternative A, and yield beneficial effects on natural settings and primitive recreation experiences compared with Alternative A. Alternative B would eliminate access for cross-country OHV recreation across GSENM, compared with Alternative A. This could result in unauthorized cross-country OHV travel occurring in certain areas and could reduce access for Escalante residents. Motorized users would likely have greater conflicts with nonmotorized recreationists on motorized routes in OHV limited areas, as this mileage would be substantially less than under Alternative A. Alternative B would also likely decrease the ability of all recreationists to access nonmotorized trails in certain areas due to the greater area managed as OHV closed.

Impacts from Other Recreational Uses and Facilities

Pedestrian use would continue to be allowed throughout GSENM under Alternative B. Opportunities for pedestrian uses in GSENM would therefore continue to be widespread, though experiences would continue to be affected (although to a lesser extent than under Alternative A) by conflicting recreational uses, such as OHV travel and recreational target shooting. GSENM management would consider designating additional trails for mountain bike and/or e-bike use in a future travel management planning process in compatible RMAs and non-RMA lands.

To provide for public health and safety, recreational facilities such as designated campgrounds and bathrooms would be allowed at some locations in accordance with RMA prescriptions. As described under Alternative A, the establishment of additional recreational infrastructure would generally enhance recreational opportunities and provide for improved visitor health and safety.

Alternative C

Impacts from Designation of Management Areas and Recreation Management Areas

Under Alternative C, the BLM would establish four management areas, under which 37,700 acres would be managed as front country, 51,700 acres would be managed as a passage area, 669,200 acres would be managed as an outback area, and 1,122,500 acres would be managed as a primitive area. These areas would be used to identify the allowable uses that meet the goals and objectives of the area while also protecting GSENM objects. The majority of GSENM would be managed as a primitive area, which would benefit natural and biological uses and recreation users seeking solitude and primitive opportunities to a greater extent than would the other alternatives.

In addition to management areas, 14 SRMAs would be designated to provide for specific outcomes-based recreational experiences in an identified recreational setting. Eight ERMAs would also be designated to facilitate specific recreational outcomes while ensuring resource protection. These RMAs would not cover all lands within GSENM, which would leave some areas without any recreation prescriptions (**Figure 3-48, Appendix A**). Alternative C includes the greatest designation of SRMAs of all alternatives and,

therefore, would provide the most prescriptive management of allowable recreation activities and experiences of all alternatives. .

Impacts from Recreational Target Shooting

Under Alternative C, recreational target shooting would be prohibited in the front country area, RNAs (ACECs), and SRMAs. In the passage, outback, and primitive areas, target shooting would be prohibited within 0.25 miles of residences, campgrounds, and developed recreation sites and trails campground and from, on, or across routes, as well as designated dispersed camping areas and developed recreation sites and trails. Overall, recreational target shooting would be prohibited across 1,215,100 acres. These restrictions would not pertain to the lawful pursuit of game. This would reduce the potential for displacement of and conflicts with other recreational users in GSENM compared with Alternative A; however, these conflicts could still exist across the 681,000 acres where recreational target shooting would be allowed. Alternative C would adversely impact the shooting sports community to a larger extent than under Alternatives A and B because it would close more acreage to recreational target shooting.

Impacts from Off-highway Vehicle Travel

Under Alternative C, the BLM would manage 1,209,900 acres as closed to OHV travel across the No Mans Mesa RNA (ACEC), WSAs and ISAs, some lands with wilderness characteristics, and the primitive area, which would prevent opportunities for motorized recreation in these areas. This would effectively close 7 miles of designated routes to passenger vehicle use, compared to Alternative A; however, official route closures are implementation-level decisions that would be analyzed in a travel management planning process (**Figure 3-49, Appendix A**). OHV travel on designated routes would continue to be allowed on the remaining 655,700 acres in GSENM (**Figure 2-28, Appendix A**). This would limit resource damage from cross-country OHV travel, yield beneficial effects on natural settings and primitive recreation experiences, provide a greater ability to recreate away from motorized routes, and limit access for cross-country OHV recreation, as well as access for nonmotorized routes in certain areas across GSENM, similar to Alternative B.

Impacts from Other Recreational Uses and Facilities

Pedestrian use would continue to be allowed throughout GSENM under Alternative B. Opportunities for pedestrian uses in GSENM would therefore continue to be widespread, though experiences would continue to be affected (although to a lesser extent than under Alternative A) by conflicting recreational uses, such as OHV travel and recreational target shooting. GSENM management would consider designating additional trails for mountain bike and/or e-bike use in a future travel management planning process in compatible RMAs.

To provide for future recreational needs, management areas would identify areas in which future recreational facilities could be developed. In general, the front country would allow for facilities to accommodate larger groups while facilities would be nonexistent in the primitive area. As described under Alternative A, the establishment of additional recreational infrastructure would generally enhance recreational opportunities and provide for improved visitor health and safety.

Alternative D

Impacts from Designation of Recreation Management Areas

Under Alternative D, the BLM would manage 161,000 acres as 10 SRMAs and 251,200 acres as 4 ERMAs. These RMAs would not cover all lands within GSENM. Alternative C would yield greater long-term beneficial effects on the management and protection of specific recreational opportunities and experiences in SRMAs compared with Alternative A. However, since Alternative D would designate the fewest acres within RMAs of all alternatives, this would limit the BLM's ability to manage for specific recreation values and characteristics across the GSENM, which would ultimately limit beneficial impacts on recreational use compared with the other alternatives.

Impacts from Recreational Target Shooting

Under Alternative D, recreational target shooting would be prohibited across the entire GSENM. These restrictions would not pertain to the lawful pursuit of game. This would reduce the displacement of and potential for conflicts with other recreational users in GSENM compared with all other alternatives, but also eliminate access for all recreational target shooting. This could lead to instances of unauthorized recreational target shooting in GSENM.

Impacts from Off-highway Vehicle Travel

Under Alternative D, the BLM would manage 1,638,800 acres as closed to OHV travel, which is the most of any alternative. This would effectively close 7 miles of designated routes to passenger vehicle use compared with Alternative A; however, official route closures are implementation-level decisions that would be analyzed in a travel management planning process (**Figure 3-50, Appendix A**). Recreational access would be limited to 226,800 acres on designated roads. This would limit resource damage from cross-country OHV travel, provide the greatest ability to recreate away from motorized routes, and yield beneficial effects on natural settings and primitive recreation experiences similar to Alternatives B and C in areas closed to OHV travel. Alternative D would also reduce access for motorized users, as well as access to nonmotorized routes in certain areas, the most of all alternatives due to it managing the most acreage as OHV closed.

Impacts from Other Recreational Uses and Facilities

Pedestrian use would continue to be allowed throughout GSENM under Alternative D. Opportunities for pedestrian uses in GSENM would therefore continue to be widespread. GSENM management would consider additional trails designated for mountain bike and/or e-bike use in a future travel management planning process in compatible RMAs.

To provide for future recreational needs, recreational facilities would be allowed in accordance with RMA prescriptions. As described under Alternative A, the establishment of additional recreational infrastructure would generally enhance recreational opportunities and provide for improved visitor health and safety. However, land use allocations would be the most limited under Alternative D of all alternatives and would curtail discretionary uses including recreation and activities under SRPs.

Cumulative Impacts

The cumulative impacts analysis area for recreation is the planning area and surrounding BLM-managed land accessible to recreation users. The area includes recreation areas that could be directly affected by management decisions and surrounding BLM-managed lands that could also experience recreation impacts

due to management decisions in the planning area. Cumulative impacts may result from activities in adjacent communities, recreation and visitation to nearby BLM-managed lands, and resource-use activities. Past, present, and reasonably foreseeable recreation projects in the analysis area could contribute to cumulative impacts. These projects include the development of additional hiking and mountain biking trails as part of the East Zion Initiative Environmental Assessment, deferred maintenance and improvements of the Calf Creek Recreation Area Site, and various SRPs (**Appendix F**, Analytical Framework). In general, these projects would contribute to beneficial cumulative impacts by improving recreation facilities and concentrating recreation to developed areas (Monz 2021; Marion et al. 2020). If recreation demands continue to increase across the state of Utah in general and in the “Mighty Five” National Parks in southern Utah near GSENM in particular, visitors seeking small-group, primitive, and unconfined recreational experiences may choose to visit GSENM. All alternatives include SRMAs and/or RMZs that identify where the BLM would generally prioritize the expenditure of funding and resources for recreation management, though the size of these RMAs varies by alternative. Alternatives A and B, which provide less-prescriptive ERMA management on the majority of the planning area, may also provide additional management flexibility to adapt to future changes in recreation use and needs and address resource conflicts associated with increasing recreation through the development of new recreation facilities and infrastructure. Alternatives C and D would provide more prescriptive SRMA management across the decision area, which may attract certain recreationists to GSENM due to the emphasis of certain uses.

3.17.3 References

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3.18 TRAVEL MANAGEMENT

3.18.1 Affected Environment

Current Conditions

Current transportation and access routes into and through the decision area consist of federal and state highways, BLM roads, primitive roads and trails, county road systems, and ROW access roads. The transportation system encompasses approximately 920 miles of designated routes within GSENM. This includes two paved roads that provide access to GSENM: U.S. Highway 89 on the south and State Route 12 (also referred to as Highway 12) on the north. The current travel system is shown on **Figure 3-51, Appendix A**.

Highways and main roads allow access to BLM-managed lands in the planning area. These are the Burr Trail Road, Highway 12, U.S. Highway 89, Hole-in-the-Rock Road, Skutumpah Road, Cottonwood Road, House Rock Valley Road, and Smoky Mountain Road. Secondary paved and unpaved roads used heavily by the public primarily include roads maintained by Kane and Garfield Counties. All OHV (refers to all public motorized vehicles, including dirt motorcycles, passenger vehicles, dune buggies, jeeps, four-wheel drive vehicles, sport utility vehicles, over-the-snow vehicles, UTVs and ATVs, helicopters and motorized aircraft [when on or immediately over land], and drones, as defined in 43 CFR 8340.0-5[a]), and mechanized [such as bicycles]) travel within the decision area is limited to routes designated for those purposes. OHV use on BLM-managed lands provides access, experience, and connectivity, as outlined in BLM Handbook H-1626. **Table 2-1** displays the existing travel designations in the planning area per the 2020 Approved RMPs (BLM 2020a, b). Mechanized travel is allowed on trails designated for that use as well as on routes and areas designated for OHV use, unless specifically prohibited. Most of the state- and

county-maintained roads have either an existing BLM-issued ROW or are claimed as Revised Statute 2477²⁸ roads by the counties.

The GSENM 2020 ROD amended the GSENM Travel Management Plan (BLM 2000) to include the V-Road and Inchworm Arch Road as open to and available for OHV use. These routes are currently used by local residents and tourists to access certain archaeological and geological sites in GSENM. Please refer to the GSENM 2020 ROD for more information regarding the designation of these two routes (BLM 2020a).

Currently, only ATVs/UTVs and high-clearance, four-wheel-drive vehicles can access the end of V-Road. This is due to deep sand and erosion damage along the old roadway. V-Road is used to access the Cosmic Vortex geological feature. The Inchworm Arch Road, before designated in 2020, was used by locals and recreationalists to access the Inchworm Arch. The original alignment of the route crossed through an area with a high density of cultural resources and portions of two archaeological sites. The 2020 GSENM ROD required BLM to re-route the Inchworm Arch road to avoid these sensitive resources. The route provides the only OHV access to a natural arch site, and it receives use from both motorized and nonmotorized recreationists. The Inchworm Arch Road provides access for recreational opportunities associated with Inchworm Arch as well as access for those seeking opportunities for hunting, shooting, and other uses.

In addition to arterial and collector routes, there are numerous tertiary routes that connect more remote locations to the larger roads. These routes are used for recreational purposes, access to range improvements, and access to inholdings not managed by the BLM. Most of these routes are not paved; they are unimproved and consist of dirt, clay, or gravel surfaces. Additionally, routes are known to exist and receive public use that are not included in the 920 miles of designated routes available for public use. The decision area includes a few abandoned backcountry airstrips on BLM-managed land. Some of these are within WSAs. The New Home Bench airstrip near Boulder, Utah, is the only maintained airstrip identified in the 2000 MMP (BLM 2000).

Subsequent transportation management planning following the development of the RMP could consider and analyze additional routes for inclusion in the TMP. Under all action alternatives, the TMP would protect GSENM objects and consider opportunities for motorized and nonmotorized/nonmechanized trails.

ATV/UTV use also has become a popular method of recreation and a means of transportation while hunting, fishing, or camping. ATV/UTV use has become a significant use due to the increase in the number of users who participate in this recreational opportunity, their increased commercial availability (purchase

²⁸ The State of Utah and its counties may hold valid existing ROWs in the Planning Area pursuant to Revised Statute 2477 (R.S. 2477), Act of July 28, 1866, Chapter 262, 8,14; Stat. 252, 253, codified at 43 USC 932. Congress repealed R.S. 2477 through passage of FLPMA. R.S. 2477 rights are determined through a process that is entirely independent of the BLM's land use planning process. This planning effort is not intended to provide any evidence bearing on or addressing the validity of any R.S. 2477 assertions and does not adjudicate, analyze, or otherwise determine the validity of claimed ROWs. Nothing in this BLM RMP is intended to extinguish any valid existing ROW or alter in any way the legal rights the state and counties may have to assert and protect R.S. 2477 rights in federal court consistent with applicable law. At such time as a decision adjudicates an R.S. 2477 ROW, the BLM will adjust its management accordingly, if necessary.

and rental opportunities), and the marketing of multi-passenger ATVs and UTVs. ATVs and UTVs are also often driven by local ranchers for administration of their grazing operations.

UTVs are larger than ATVs, often taking up the entire width of routes. This can create a safety hazard on narrow roads. Additionally, as UTVs are more powerful and have significant off-road capabilities, they can result in greater resource impacts, including dust, soil and vegetation compaction, and disturbances to wildlife and other users. They can also change the composition of roads by adding berms, which makes it challenging for normal pickup vehicles to navigate. This necessitates continual road maintenance to ensure accessibility to all vehicles.

Within the planning area, there are currently 35 developed trailheads; however, the 3-mile Lower Calf Creek Falls Trail is the only designated trail in GSENM. Pedestrian trails are the primary means of nonmotorized and nonmechanized travel, as many so-called trails change over time due to flooding, lack of use, or simply because the route crosses slick rock or sand dunes and is not easily identifiable. In many cases, route braiding occurs, or a proliferation of rock cairns is created.

There are several scenic drives in GSENM. These are addressed in **Section 3.20.3**, Scenic Routes.

Trends

Currently, high-use recreation areas experience heavy traffic demands that frequently require physical management during high-use periods (weekends, holidays, and school breaks in the spring and fall months). Additionally, there is a lack of adequate public parking at popular recreation areas during high-use periods, which can pose a public health and safety concern and lead to adverse impacts on resources.

Passenger vehicles represent the greatest percentage of OHV use on BLM routes. There are frequent public reports of unauthorized cross-country OHV travel in GSENM. Most routes are not clearly signed as designated routes open to OHV use. Additionally, there is inconsistency with signage on the ground. For example, some signs include county road numbers while others use BLM road numbers. Clarifying which roads are open and closed to the public and improving the overall signage program could minimize unauthorized cross-country travel in GSENM.

Over the past 20 years, ATV/UTV use has become one of the fastest-growing recreational activities in southwestern Utah, drawing thousands of visitors each year. This trend is expected to continue because visitors are drawn to this area to experience the numerous routes and trails available for OHV use, the diverse backcountry opportunities and spectacular scenery, and the variety of world-class recreational opportunities that the landscape provides.

Forecasts

Visitation is increasing in Kane and Garfield Counties, which is expected to result in increased public demand on some routes within the existing transportation system. Increased travel across BLM-managed lands by motorized and nonmotorized equipment could increase the need to manage, maintain, and improve or expand the current transportation system. The undeveloped nature of the area is highly valued by certain user groups, and the BLM would need to carefully consider development and improvements.

ATV/UTV travel is expected to intensify in high-demand areas and adjacent to communities. ATV/UTV management in some areas no longer adequately addresses the issues that are arising because of increasing

ATV/UTV travel. This has resulted in conflicts that vary by location. The use of ATVs and newer UTVs and the associated resource and user conflicts are expected to grow.

3.18.2 Environmental Consequences

Refer to **Section F.23**, Travel Management, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management affect the travel and transportation system in GSENM?

Impacts Common to All Alternatives

Management for lands and realty, fish and wildlife, special designations, and recreation may result in impacts on travel and transportation management. For example, management that limits or restricts access based on the values of protecting and enhancing habitat, special status species, or other resources would have an adverse impact on transportation. New roads built as part of ROWs, for example, could increase access if they are integrated in the transportation system for public use. Certain designations of BLM-managed surface land can restrict travel that adversely affects transportation and access, including RMAs; ACECs, WSAs, and other special designations, as well as management of lands with wilderness characteristics to preserve their wilderness characteristics.

Delineation of Travel Management Areas

Travel management areas are a planning tool for delineating a sub-unit of the decision area where unique travel management circumstances result in the need for particular focus and additional analysis. Alternatives B, C, and D delineate the decision area into the following travel management areas:

- Garfield County
 - Hole-in-the-Rock Road
 - Circle Cliffs
- Kane County
- Kaiparowits
- Escalante Canyons
- Grand Staircase

While the travel management area delineations cover the entire decision area for Alternatives B, C, and D, adjustments to travel management area boundaries may be made prior to conducting travel management planning.

Route designations are implementation-level decisions that will be analyzed and approved in accordance with 43 CFR 8342.1 separately through the TMP process. This process evaluates and designates routes to provide a high-quality travel network for a wide variety of uses. The TMP provides a process for determining a comprehensive and maintainable route network while meeting resource management needs and protecting GSENM objects. Examples of beneficial impacts of designating routes through a TMP include improved access, experience, and connectivity; the promotion of safety for all users; boundary signage and minimization of conflict among various uses of BLM-managed lands; and reduction in route redundancy, resource degradation, and habitat fragmentation in the planning area. TMPs may also provide

an opportunity for coordinating transportation planning with Kane and Garfield Counties or adjacent communities. Such coordination could reduce access issues and management conflicts, improve the safety and convenience of the traveling public, and provide a more sustainable use of resources.

Impacts from Changes to the GSENM Route Network

The removal of a route from the existing GSENM TMP is an implementation-level decision. Alternatives A, B, and C do not propose changes to the existing GSENM TMP as part of this land use planning effort. Alternative D would amend the current GSENM TMP by closing the Inchworm Arch Road to OHV use. This route is currently used by local residents and tourists to access a geological site, known as the Inchworm Arch, which is identified in Proclamation 10286 as a GSENM object. Closing this route would adversely affect recreation users by removing legal access to the Inchworm Arch. Because Alternatives A, B, and C would not close this route, continued OHV use of this open route could result in impacts on cultural and paleontological resources, nonmotorized recreation and travel, soil and water resources, wildlife, and other resources and uses. **Appendix G**, Inchworm Arch Road Interdisciplinary Route Evaluation Form and Analysis, provides detailed site-specific analysis of the impacts associated with potential closure of the Inchworm Arch Road.

Impacts from OHV Area Designations

All BLM-managed lands are required to have OHV area designations (43 CFR part 1600 and part 8342.1). Areas must be designated as open, limited, or closed to OHV travel. Open areas allow all types of vehicle use year-long anywhere within an open area. Open designations are used for intensive OHV use areas where there are no special restrictions or where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel. Limited areas restrict vehicle use within specified areas and/or on designated routes, roads, vehicle ways, or trails subject to restrictions. The limited designation is used where OHV use must be restricted to meet specific resource management objectives. These restrictions may be of any type but are generally within the following categories or combination of categories: number of vehicles, types of vehicles, time or season of vehicle use, authorized or permitted use only, use on existing routes and trails, use on designated routes and trails, and other restrictions. While the designation of an area to the OHV limited allocation is a land use planning decision, the specific limitations applicable to the area are considered implementation-level decisions. The standard limitation will be “limited to designated routes.” Closed areas are areas where OHV use is prohibited. Access by means other than motorized vehicle use is permitted. Areas are designated closed if closure to all vehicular use is necessary to protect resources, promote visitor safety, or reduce user conflicts. The BLM Authorized Officer may expressly authorize motorized use in closed areas for administrative and permitted use, because such use is expressly authorized and exempt from the OHV regulations per 43 CFR 8340. The criteria used to make the area designations are based on the management prescriptions described in the alternatives.

Alternative A

Under Alternative A, OHV use would continue to be limited to the 920 miles of designated routes across 1,862,700 acres, except in No Mans Mesa RNA (ACEC), where 2,800 acres would be closed to OHV use, and the Little Desert RMA, where 100 acres would continue to be managed as open to cross-country OHV use. Open OHV areas may attract a specific tourism sector; however, the one OHV open area on GSENM is mostly used by local residents. Providing an area for those seeking this type of activity may help avoid instances of cross-country OHV travel in closed or limited areas. Alternative A would yield the

greatest benefits to travel, transportation, and access because it would manage the fewest acres of OHV closed areas of the alternatives.

Under Alternative A, travel and transportation would be managed consistent with the current transportation route map (**Figure 3-51, Appendix A**) or as updated through future implementation-level planning. Route improvements or maintenance beyond levels allowed in the 2000 MMP is not described in the 2020 Approved RMPs. This could lead to public safety concerns on certain routes that could benefit from maintenance or improvements.

Management direction for landings and takeoffs of motorized aircraft in GSENM is not described in the 2020 Approved RMPs. Alternative A would yield the greatest benefits to access for motorized aircraft use because it does not restrict motorized aircraft use. However, this could limit the BLM's ability to protect GSENM objects, compared with Alternatives B, C, and D.

Alternative B

Under Alternative B, the BLM would manage 953,100 acres as closed to OHV travel in WSAs and ISAs, lands with wilderness characteristics identified for protection within WSAs, and No Mans Mesa RNA (ACEC), which would prevent opportunities for OHV access in these areas. This would not close any designated routes to OHV use. OHV travel on designated routes would continue to be allowed on the remaining 912,500 acres in GSENM (**Figure 2-27, Appendix A**). This would limit resource damage from cross-country OHV travel compared with Alternative A, but would also reduce access for local residents and recreationists compared with Alternative A. Alternative B would substantially limit access opportunities for OHVs across GSENM compared with Alternative A due to the additional acreage managed as closed to OHV use. This could, in turn, reduce access for other uses across GSENM that use motorized routes to access areas for recreation and the like compared with Alternative A. This could also result in increased instances of cross-country OHV travel in closed or limited areas.

Under Alternative B, routes could be maintained and improved to meet public health and safety needs. Specifically, Hole-in-the-Rock Road, Cottonwood Road, and House Rock Valley Road would be authorized for improvements after site-specific NEPA is completed. This could reduce public safety concerns compared with Alternative A.

Alternative B would clarify motorized aircraft use to include, but not be limited to, fixed-wing aircraft, helicopters, powered paragliders, electric aircraft, and drones. Under Alternative B, public use of GSENM for landings and takeoffs of motorized aircraft would be limited to routes designated for such landings and takeoffs in OHV limited areas in future implementation-level decisions and would be prohibited within 300 feet of developed recreation sites and areas. This would limit access for motorized aircraft compared with Alternative A, but enable the BLM to better protect GSENM objects.

Alternative C

Under Alternative C, the BLM would manage 1,209,900 acres as closed to OHV travel across the No Mans Mesa RNA (ACEC), WSAs and ISAs, some lands with wilderness characteristics, and the primitive area, which would prevent opportunities for OHV recreation in these areas. This would effectively close 7 miles of designated routes (the V-Road) to passenger vehicle use compared with Alternative A. OHV travel on designated routes would continue to be allowed on the remaining 655,700 acres in GSENM (**Figure 2-28, Appendix A**). Similar to Alternative B, this would limit resource damage from cross-

country OHV travel compared with Alternative A and access for local residents and recreationists compared with Alternative A. Alternative C would significantly limit access opportunities for OHVs across GSENM compared with Alternative A and to a larger extent than Alternative B. This could result in similar types of impacts on access across the GSENM described under Alternative B, but to a larger extent due to the additional acreage managed as closed to OHV use.

Under Alternative C, routes could be maintained and improved to meet public health and safety needs similar to Alternative B.

Alternative C would clarify motorized aircraft use similar to Alternative B. Under Alternative C, public motorized aircraft take-offs and landings could occur in the front country and passage management areas, the same as Alternative B, but would be prohibited in the outback and primitive management areas; they could be authorized on a case-by-case basis through a formal permitting process, where use would be beneficial to protecting GSENM objects. This would result in more impacts on motorized aircraft access compared with Alternatives A and B because it contains the more restrictions than Alternative B.

Alternative D

Under Alternative D, the BLM would manage 1,638,800 acres as closed to OHV travel, which is the most of any other alternative. This would effectively close 7 miles of designated routes (the V-Road) to passenger vehicle use compared with Alternative A. OHV access would be limited to designated routes within 226,800 acres. This would limit resource damage from cross-country OHV travel and reduce access for local residents compared with Alternative A. Management of OHV areas under Alternative D would be most likely to adversely affect transportation and access across GSENM due to the scale of acres closed to OHV use. This could result in greater impacts on travel, transportation, and access than those described under Alternatives B and C.

Under Alternative D, routes could be maintained and improved to meet public health and safety needs similar to Alternatives B and C. Under Alternative D, impacts on access for motorized aircraft would be the same as those described under Alternative C for the outback and primitive management areas.

Cumulative Impacts

The cumulative impacts analysis area is the planning area, the extent of transportation routes that intersect the planning area, and transportation routes in areas adjacent to the planning area. This area encompasses the full extent of transportation routes that could experience impacts resulting from management decisions in combination with other past, present, and reasonably foreseeable actions. Transportation and road networks adjacent to BLM-managed lands in the planning area include routes maintained by other federal, state, and county agencies and private landowners. Maintenance of and improvements to federal and state highways would provide arterial connections to BLM roads and county-maintained routes and would improve access throughout the planning area. However, the RMP will not affect use of existing state or federal highways or adjudicated roads. Potential increases in traffic from development under Alternatives B and C, combined with increased traffic associated with local residents and an expected continued increase in visitors in the cumulative impacts analysis area, could cumulatively affect traffic and road conditions. Additionally, management decisions outside of GSENM that would provide OHV opportunities, such as OHV open areas, could cumulatively affect traffic and road conditions by diverting recreationists to locations outside of GSENM.

See **Appendix F**, Analytical Framework, for a list of past, present, and future projects that could result in cumulative effects.

3.18.3 References

BLM (United States Department of the Interior, Bureau of Land Management). 2000. Grand Staircase-Escalante National Monument Management Plan. February. Internet website:

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3.19 LANDS AND REALTY

3.19.1 Affected Environment

Current Conditions

Land Use Authorizations

There are 137 active ROWs and other land use authorizations encumbering approximately 8,700 acres of BLM-managed land throughout the decision area. These are primarily access road ROWs and grants for other facilities that have existed for decades primarily without alteration. There are ROW grants associated with the Upper Valley Oil Field and Title 23 ROWs that allow federal highways to extract materials. Many authorizations predate GSENM designation, and they continue under the valid existing rights language in Proclamation 10286. Others were authorized under the 2000 MMP (BLM 2000), the 2020 GSENM RMPs (BLM 2020a), or the 2020 KEPA RMP (BLM 2020b) for uses such as communication facilities, utilities, and access roads. These post-national monument designation authorizations are subject to various terms and conditions to provide protection of GSENM's objects or other applicable resources, as specified in the relevant plan under which they were authorized.

Utility Corridors

Apart from the land use authorizations, there are 11,400 acres of utility corridors within the decision area (BLM 2020b). The first is a congressionally designated utility corridor. Public Law 105-355 designated a utility corridor along U.S. Highway 89 in Kane County, Utah, including the portion of U.S. Highway 89 in GSENM. The utility corridor extends 240 feet north and 500 feet south from the highway centerline.

Aside from the highway itself, several other utilities, including a recently constructed, buried fiber-optic line and several above-ground power lines, are within this route. One of the above-ground power lines is

being upgraded; the existing line will be decommissioned and removed. Under the 2020 KEPA RMP (BLM 2020b), projects within a portion of this corridor are subject to a timing restriction that provides protection for seasonal mule deer migration while facilitating future projects in the corridor.

The second utility corridor is under Section 368 of the Energy Policy Act of 2005 (Public Law 109-58), Energy Corridor 68-116, which spans portions of northern Arizona and southern Utah, including an area south of U.S. Highway 89 (**Figure 3-52**, Section 368 Energy Corridor, in **Appendix A**). This segment is part of the regional West-wide Energy Corridor project and hosts a segment of the Navajo-McCullough 500-kilovolt power line, which previously transmitted electricity from a coal-fired power plant outside Page, Arizona, to Las Vegas, Nevada, and California. The BLM is currently processing a renewal application for the Navajo-McCullough power line ROW, and use is expected to continue within this corridor.

Several de facto utility corridors have also emerged along main transportation routes and adjacent gateway communities in the decision area, including the Johnson Canyon Road/Skutumpah Road corridor east of Kanab; the State Route 12 corridor in eastern Garfield County; Cottonwood Road, which hosts large power transmission lines operated by local power companies transmitting power from the Glen Canyon Dam hydroelectric power plant; and the communities of Big Water, Tropic, Cannonville, Henrieville, Escalante, and Boulder, where utilities often occupy adjacent GSENM lands to serve these communities.

Communication Sites

The BLM typically issues communication use leases for communication facilities on BLM-managed land. Two communication sites are in the decision area: Buckskin Ridge in Kane County, east of Kanab between U.S. Highway 89 and the Arizona border, and the Head of the Rocks in Garfield County, east of Escalante along the State Route 12 corridor. The Head of the Rocks communication site is 1 acre, and the Buckskin Ridge communication site is 2.5 acres. Glen Canyon also holds a lease for a stand-alone repeater site near Warm Butte, northeast of Big Water in Kane County. The Glen Canyon communication site is 1 acre. See **Table 3-89** for more detail.

Table 3-89. Communication Sites

Site	Number of Users	Location	Site Management Plan
Head of the Rocks	4	Township 35 South, Range 4 East, Section 22	September 12, 2014*
Buckskin Ridge	6	Township 42 South, Range 2 West, Section 27	September 26, 2017
Glen Canyon	1	Township 42 South, Range 4 East, Section 31	None

Sources: BLM 2018; BLM GIS 2022

*The site management plan is being revised to reflect recent changes approved at the site.

Land Tenure (Ownership)

The September 18, 1996, proclamation establishing GSENM stated that “All federal lands and interests in lands within the boundaries of GSENM are hereby appropriated and withdrawn from entry, location, selection, sale, leasing, or other disposition under the Public Laws, other than by exchange that furthers the protective purposes of the monuments.” Proclamation 10286, signed October 8, 2021, carried forward this same language.

The BLM consolidated land ownership patterns in GSENM through a relatively large-scale land exchange with the State of Utah School and Institutional Trust Lands Administration under Public Law 105-335. The BLM subsequently completed several other acquisitions of inholding parcels in accordance with the 2000 MMP (BLM 2000), which allowed for land exchanges and acquisitions as long as the current owner was a willing participant, and the action was in the public interest and in accordance with other management goals and objectives.

The 2020 KEPA RMP (BLM 2020b) and 2020 GSENM RMPs (BLM 2020a) specified criteria to be considered prior to pursuing any form of land tenure action. The BLM continues to pursue the acquisition of inholdings in GSENM. The planning area contains approximately 14,800 acres of inholdings.

Apart from exchanges and acquisitions, however, the withdrawal of lands in GSENM prohibits other types of land tenure actions allowed under FLPMA Title II; this includes Section 203 sales and other current disposal actions, such as those under the Recreation and Public Purposes Act or the Desert-land Entry Act.

Trends

Land Use Authorizations

After Proclamation 9682 removed national monument designation from some parts of the planning area, 42 ROWs or land use authorizations, encompassing 5,800 acres, were requested in the planning area from December 4, 2017, to December 4, 2021. Of these, 28 of the requests and over 5,700 acres were for minimum-impact filming requests. For the 4 years before Proclamation 9682 (December 4, 2013 to December 4, 2017), 49 ROWs or land use authorizations were requested, encompassing 2,400 acres; 39 of the 49 requests and most of the acres were for minimum-impact filming permits.

These trends show a slight decrease in ROW requests and in land use authorization requests for film permits. This decrease in requests follows a change to the BLM filming guidance after the *Price v. Barr* court decision, which moved more filming projects into the “casual use” category that does not require permits. However, the *Price vs. Barr* court decision has been reversed, and the BLM expects an increase in land use authorizations to follow.

Utility Corridors

Utility corridors remain available for consideration of new ROW requests. Requests for all major ROWs have occurred within existing designated corridors.

Communication Sites

New communication site requests remain available for consideration. Since 2017, only one new communication site lease has been authorized in the decision area. An environmental assessment was completed in September 2020 to approve changes at the Head of the Rocks communication site that would move the existing facilities off a highly visible hilltop and screen much of the new facilities from view.

Land Tenure (Ownership)

Under the September 18, 1996, proclamation, sales and land disposal actions, other than exchanges and acquisitions, were prohibited. In December 2017, Proclamation 9682 reduced GSENM’s boundaries by approximately 50 percent and opened much of the former GSENM to discretionary uses. Sales and other

disposal actions were allowed on lands removed from GSENM (that is, the KEPA), but specific eligible parcels were not identified under the 2020 KEPA RMP (BLM 2020b) so that such actions could be considered.

Between September 1996 and December 2017, 434 acres of land were purchased from willing sellers within GSENM's boundaries, and 180,000 acres were acquired in a land exchange with the State of Utah. Between December 2017 and October 2021, no land was disposed of or acquired in the decision area. However, in October 2021, President Biden issued Proclamation 10286, which restored the GSENM boundaries and conditions that existed prior to December 4, 2017. The BLM is once again pursuing the acquisition of inholdings in GSENM from willing sellers.

Forecasts

Land Use Authorizations

The number of ROW applications will likely remain constant or increase slightly, with renewals and new applications.

The trend of fewer commercial film permit applications seen between December 4, 2017, and December 4, 2021, will likely reverse as BLM film permit policy continues to evolve due to recent court decisions. These permits will increasingly be small-scale projects designed for websites and other social media platforms, rather than more traditional television, motion picture, and advertising shoots. Under current BLM policy, many of these projects fall into the undefined policy areas regarding whether they are casual use or require a film permit. Most projects currently are considered casual use, but the BLM still must review each project proposal to determine whether a permit is required. Most current filming proposals include the use of small drones, although the policy for drone use on BLM-managed lands is limited.

Utility Corridors

The Page, Arizona, coal plant closed in 2019, which makes the future of the Navajo-McCullough 500-kilovolt power line uncertain. However, according to power company officials, there is still a need for continued operation of the transmission line and the Section 368 corridor. Due to its relatively isolated location, however, other new facilities will likely continue to be concentrated within the designated U.S. Highway 89 corridor and other de facto corridors throughout the decision area. The number of ROW projects in existing utility corridors will likely increase over time.

Communication Sites

Two formal communication sites and one single-use site are in the decision area. Only the Head of the Rocks and Buckskin Ridge communication sites have communication site plans. The single-use Glen Canyon communication site does not include a site plan.

The Head of the Rocks plan needs to be amended based on a recent BLM environmental assessment that addressed permit changes regarding safety and visual resources concerns. Much of the planned development at the Buckskin Ridge site is already completed, and a site plan was completed. Any future development would continue incrementally as outlined in the current Buckskin Ridge Communication Site Management Plan.

Land Tenure (Ownership)

The BLM is likely to pursue an increase in the acquisition of inholdings at GSENM from willing sellers. The main source of funding for land acquisitions in GSENM is the Land and Water Conservation Fund. This funding has increased recently and is expected to remain steady or to increase in the near future. With the increase in funding, the BLM is pursuing additional realty staff, including staff that could support GSENM with future acquisitions.

However, at some point, it is expected that identifying willing sellers of GSENM inholdings may become increasingly difficult. Land exchanges could be another possible way to acquire land from landowners who may not be interested in selling inholdings. Land exchanges have been proposed that could possibly further the protective purposes of GSENM, and these may be pursued in the future to improve management of GSENM. The BLM will manage land tenure actions in the decision area on a case-by-case basis, in accordance with criteria developed in this planning effort and as personnel and priority workload allow.

3.19.2 Environmental Consequences

Refer to **Section F.24**, Lands and Realty, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would proposed management affect land use authorizations and land tenure in the decision area?

Impacts Common to All Alternatives

Land Use Authorizations

The BLM would manage the seasonal mule deer migration corridor along U.S. Highway 89 under each alternative as a seasonal avoidance area for ROWs (October 1 to April 30). Therefore, construction or maintenance of authorized ROWs during the seasonal avoidance period would be limited under all alternatives.

If ROWs are not approved within GSENM, adjacent lands surrounding GSENM could see impacts from such developments, potentially impacting local communities and landowners.

Land Tenure (Ownership)

Under all the alternatives, the BLM would authorize only one access route to private land parcels unless public safety or local ordinances warrant additional routes. Under all the alternatives, to be considered for land acquisition or exchange, lands must further the protective purposes of GSENM and meet one or more of the following land tenure criteria:

- The acquisition or exchange is in the public interest and accommodates the needs of State, local, or private entities, including the needs for the economy, community growth, and expansion. Also, it is in accordance with other land use goals, objectives, and RMP planning decisions.
- The land acquisition or exchange results in a net gain of important and manageable resource values on public lands, such as crucial wildlife habitat, cultural sites, high-value recreation areas, high-quality riparian areas, live water, threatened and endangered species habitat, or areas key to maintaining productive ecosystems.

- The acquisition or exchange ensures accessibility of public lands in areas where access is needed and cannot otherwise be obtained.
- The acquisition or exchange is essential to allow effective management of public lands in areas where consolidation of ownership is necessary to meet resource management objectives.
- The acquisition or exchange results in acquisition of lands that serve a national priority as identified in national policy directives.

Alternative A

Land Use Authorizations

Under Alternative A, all lands would continue to be managed as either avoidance areas or open for ROWs, permits, and leases, with the exceptions of WSAs, which are exclusion areas. Any new authorizations would be required to be consistent with the protection of GSENM objects. Approximately 881,300 acres would continue to be managed as ROW exclusion areas, 332,000 acres would continue to be considered ROW avoidance areas, and 21,100 acres would continue to be considered ROW seasonal avoidance for the seasonal mule deer migration corridor along U.S. Highway 89. However, 630,400 acres would continue to be open to ROW authorization. This represents current management and therefore no impacts on land use authorizations would occur under this Alternative. However, the BLM could expect an increase in land use authorization applications dependent on updates to BLM film permit policy due to the recent court decisions.

Utility Corridors

Under Alternative A, the BLM would continue to manage 11,400 acres as designated ROW corridors in the decision area, including the Energy Corridor 68-116, which consists of 8,600 acres, and the congressionally designated utility corridor along U.S. Highway 89, which consists of 2,800 acres. This represents current management, and utility ROWs would continue to increase over time under this alternative. New facilities would likely continue to be concentrated within the designated U.S. Highway 89 corridor and other de facto corridors throughout the decision area. The 500-kilovolt Navajo-McCullough power line would continue within Energy Corridor 68-116. Other pending fiber-optic lines, if approved, would be designated within the utility corridor along U.S. Highway 89. This represents current management and therefore no impacts on utility corridors would occur under this Alternative.

Communication Sites

Under Alternative A, the BLM would continue to authorize communication site facilities in areas open to new ROWs. Under Alternative A, BLM would manage 630,400 acres as open to ROW authorizations. Only these areas would be available for new communication sites, which make up for 33 percent of the decision area. This represents current management, and the BLM would continue to authorize new communication sites under this alternative.

Land Tenure (Ownership)

Under Alternative A, land tenure adjustments would only occur if they resulted in a net increase of objects within GSENM.

Alternative B

Land Use Authorizations

Under Alternative B, all lands would be managed as either ROW avoidance areas or open for ROWs, permits, and leases. Approximately 976,400 acres would be managed as ROW exclusion areas (11 percent more than under Alternative A). Approximately 790,800 acres would be managed as ROW avoidance areas (almost 1.4 times more than under Alternative A), and 13,300 acres would be considered ROW seasonal avoidance areas for the seasonal mule deer migration corridor along U.S. Highway 89. This difference in acres is due to additional areas being managed as ROW exclusion under Alternative B. Only 85,100 acres would be open to ROW authorization (86 percent less than under Alternative A). Areas with existing utility ROWs and designated utility corridors would be managed as open for ROW location. Therefore, it is expected that ROWs would be authorized under this alternative, but most would likely fall within ROW avoidance areas because there are only 85,100 acres open to ROW authorization. Projects looking to route their ROW through or within GSENM, would be less likely to find a route under this alternative, relative to Alternative A.

Utility Corridors

Under Alternative B, the BLM would continue to manage 11,400 acres as designated ROW corridors in the decision area, including the Energy Corridor 68-116, which consists of 8,600 acres, and the congressionally designated utility corridor along U.S. Highway 89, which consists of 2,800 acres. However, utility corridors that fall within the seasonal avoidance area could see timing limitations to construction and maintenance activities, therefore confining ground-disturbing activities to certain times of the year.

Communication Sites

Under Alternative B, only 85,100 acres managed as open to ROWs would be available for new communication sites (86 percent less than under Alternative A). However, this decrease would likely not affect the development of new communication sites, as current communication sites only account for 4.5 acres within the decision area. The BLM would require applicants to demonstrate that no feasible sites outside GSENM exist for placement of facilities, prior to analyzing placement within GSENM. In combination with the reduced acreage managed as open to ROWs, this would likely reduce communication sites in the decision area relative to Alternative A.

Land Tenure (Ownership)

Under Alternative B, the BLM would remove the policy of considering net benefits of ESA-listed species during the land acquisition process. As a result, land tenure adjustments would be more likely under this Alternative relative to Alternative A.

Alternative C

Land Use Authorizations

Under Alternative C, 1,188,600 acres would be managed as ROW exclusion areas (35 percent more than under Alternative A), 646,600 acres would be managed as ROW avoidance areas (94 percent more than under Alternative A), and 19,500 acres would be managed as ROW seasonal avoidance areas (7 percent more than under Alternative A). Only 10,900 acres would be open to ROW authorizations (98 percent less than under Alternative A). The BLM would authorize access ROWs to private inholdings, if required by law or regulation. Under this alternative, there would likely be a decrease in new ROWs due to restrictions on ROW authorizations. This would impact projects looking to establish new ROWs within

or through GSENM, as it is likely they would have to route around GSENM or carefully route their ROW within the 10,900 acres of land open for ROWs. This would also result in more ROWs being located on lands adjacent to or near, but not within, GSENM.

Utility Corridors

Under Alternative C, 11,400 acres would be managed as open to ROW authorization. Like Alternative A, the BLM would continue managing 11,400 acres as designated ROW corridors in the decision area for renewals and upgrades, including the Energy Corridor 68-116, which consists of 8,600 acres, and the congressionally designated utility corridor along U.S. Highway 89, which consists of 2,800 acres. New ROWs would be authorized outside of the preexisting designated utility corridors, although only in avoidance areas because the utility corridors comprise the total ROW open acreage. Therefore, no acres of existing utility ROWs would be managed, but the BLM would continue to allow renewal or upgrades of existing lines within the planning area. Therefore, the renewal application for the Navajo-McCullough 500-kilovolt power line, if approved, would continue within Energy Corridor 68-116. Also, if approved, the Lake Powell Pipeline would fall within the U.S. Highway 89 corridor.

Communication Sites

Under Alternative C, there would be no new communication sites in the outback and primitive areas to protect and restore soil health. New communication sites would be available for development only in the 11,400 acres managed as open to ROWs (98 percent less than under Alternative A). However, this decrease would likely not affect the development of new communication sites, as current communication sites only account for 4.5 acres within the decision area. The effects of requiring applicants to clearly demonstrate that no feasible off-GSENM alternatives exist for placement of facilities prior to analyzing placement within GSENM would be the same as those described under Alternative B.

Land Tenure (Ownership)

Impacts under this Alternative would be the same as those under Alternative B.

Alternative D

Land Use Authorizations

Under Alternative D, no new ROWs would be authorized, except in the congressionally designated utility corridor, private inholdings, and in seasonal avoidance areas. However, most lands would be managed as ROW exclusion areas (1,693,700 acres; 92 percent more than under Alternative A). Therefore, projects seeking to apply for a ROW within GSENM not in the congressionally designated utility corridor or in the seasonal avoidance areas would likely not be allowed to route through GSENM and would need to route around GSENM instead or seek out another project area. Adjacent lands are likely to see an increase in ROWs under Alternative D. An additional 150,100 acres would be managed as ROW avoidance areas (55 percent less than under Alternative A), and 19,500 acres would be managed as ROW seasonal avoidance areas for the seasonal mule deer migration corridor along U.S. Highway 89 (7 percent less than under Alternative A). The effects of authorizing access ROWs to private inholdings, if required by law or regulation, would be the same as those described under Alternative C.

Utility Corridors

Under Alternative D, 2,800 acres would be managed as open to ROW authorizations (96 percent less than under Alternative A). The Energy Corridor 68-116 would be undesignated, closing it to new ROWs; therefore, this would reduce the designated corridor acreage to 2,800 for the U.S. Highway 89 corridor.

Communication Sites

Under Alternative D, 2,800 acres managed as open to ROWs would be available for new communication sites (99 percent less than under Alternative A). It is likely that few communication sites would be developed under Alternative D. The effects of requiring applicants to clearly demonstrate that no feasible off-GSENM alternatives exist for placement of facilities prior to analyzing placement within GSENM would be the same as those described under Alternative B.

Land Tenure (Ownership)

Under Alternative D, effects of land tenure decisions would be the same as those described under Alternative B.

Cumulative Impacts

Lands actions underway, which are proceeding to the extent legally possible, could be affected by decisions in this RMP. The Lake Powell Pipeline ROW is pending; the BLM could authorize part of this ROW on BLM-managed land within GSENM, depending on RMP decisions. In addition, the BLM could authorize more ROWs within GSENM, such as the Newer Garkane Transmission ROW, where 14 miles of the ROW could fall within GSENM.

There is one Title 23 ROW in GSENM for exclusive use by the Federal Highway Administration. Prior to the establishment of GSENM, the Title 23 ROW was granted to the Federal Highway Administration without an expiration date. The use level in the Title 23 ROW is not tracked and could be substantial, as entities can remove gravel, stone, riprap, and the like for use on projects funded by the Federal Highway Administration. Most BLM and local county projects are not able to utilize these materials because their projects are not funded by the Federal Highway Administration.

There are also various road maintenance and resource projects within and next to GSENM. However, these have no foreseeable overlap in space and time with lands and realty actions, and therefore no resultant cumulative effects.

3.19.3 References

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3.20 SPECIAL DESIGNATIONS

3.20.1 Areas of Critical Environmental Concern, Research Natural Areas, and other Special Management Designations

Affected Environment

ACECs are areas where special management attention is required to protect and prevent irreparable damage to important historical, cultural, or scenic values; fish and wildlife resources or other natural systems or processes; or to protect life and safety from natural hazards. To be designated an ACEC, the area must meet criteria for both relevant and important values, as defined in 43 CFR 1610.7 and as defined in BLM Manual 1613, Areas of Critical Environmental Concern (BLM 1988).

RNAs are established and maintained for research and education because the land has one or more of the following characteristics: (1) a typical representation of a common plant or animal association; (2) an unusual plant or animal association; (3) a threatened or endangered plant or animal species; (4) a typical representation of common geological, soil, or water features; or (5) outstanding or unusual geological, soil, or water features (43 CFR 8223). The BLM also evaluated RNAs where special management attention beyond what is provided by the RNA designation was needed, and, if so, whether the area met relevance and importance criteria to also be considered for designation as an ACEC.

Natural Environmental Areas are other special management designations that existed prior to GSENM designation and were retained after monument designation. They are managed under ACECs.

Current Conditions

The 2000 MMP (BLM 2000) evaluated nominated ACECs, but it was determined that management of GSENM objects would be equivalent to an ACEC designation for the identified relevant and important values. As part of the 2020 planning effort, ACEC nominations were again received and evaluated. In

accordance with BLM Manual 1613 (BLM 1988), the BLM evaluated 1,193,100 acres (including some overlapping acreages) that were nominated as ACECs. Of these, 14 areas totaling 309,000 acres were determined to meet the relevance and importance criteria and eligible for consideration as ACECs in that land use planning process. The BLM determined that the protections provided by the national monument designation were adequate to protect the values identified and that no special management was required. As such, there are no designated ACECs in GSENM.

The BLM called for new ACEC nominations in the NOI for this planning effort. The BLM used the criteria found at 43 CFR 1610.7-2 and guidance in BLM Manual 1613 (BLM 1988) in evaluating nominated areas. **Appendix H** summarizes that evaluation. Four ACECs were evaluated, two of which met the relevance and importance criteria, totaling 33,000 acres. Five RNAs (ACECs) were also evaluated, four of which met the relevance and importance criteria, totaling 60,000 acres. These six areas are identified as potential ACECs or RNAs (ACECs) and are considered for designation and management in the alternatives in **Chapter 2**.

No Mans Mesa RNA (ACEC) existed prior to initial monument designation and has been retained since designation. There are also a number of ONAs (The Gulch, Escalante Canyons, Phipps-Death Hollow, Devil's Garden, and North Escalante Canyon) and the Wolverine Petrified Wood Natural Environmental Area that predated the initial monument designation. These areas were brought forward in both the 2000 MMP (BLM 2000) and the 2020 GSENM and KEPA Approved Plans (BLM 2020a and b, respectively), but no specific management was assigned to them. In preparation of this EIS, it was determined that these designations were erroneously carried forward (see **Appendix H**). Therefore, they are not carried forward in this discussion.

No Mans Mesa RNA (ACEC) was designated prior to the 1996 designation of GSENM and was grandfathered in as the only designated RNA (ACEC) in the GSENM boundary. The 2,800-acre RNA (ACEC) was designated to give primary emphasis on management of educational, scientific, and research values (BLM 2019, Appendix S). The RNA (ACEC) designation provided protection for these values by closing the RNA (ACEC) to motorized OHVs, managing the area as unavailable for livestock grazing, prohibiting campfires, and completing a management plan, including a provision for determination of fire suppression on a case-by-case basis.

Figure 2-36 (Alternatives A and D: Areas of Critical Environmental Concern and Research Natural Areas) in **Appendix A** shows these special management designations within the decision area.

Trends

Increased temperatures, impacts on vegetation diversity, and increased nonnative, invasive species resulting from climate change could impair the relevant and important values of potential ACECs.

Forecasts

Without designation as ACECs, the relevant and important values of ACECs may be impaired by the increasing levels of recreational visitors and activities.

Environmental Consequences

Refer to **Section F.25**, Special Designations – Areas of Critical Environmental Concern, Research Natural Areas, and other Special Management Designations, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would management affect the relevant and important values of potential ACECs?

Impacts Common to All Alternatives

Across all alternatives, the management of Wolverine Petrified Wood Natural Environmental Area would remain the same. This would contribute to GSENM goals of preservation of historic and scientific interests.

Alternative A

Under Alternative A, ACECs, RNAs (ACECs), and other special management designations would continue to be managed in accordance with the 2020 GSENM and KEPA RMPs (BLM 2020a and b, respectively). The GSENM has one designated RNA (ACEC), No Mans Mesa, as shown in **Table 3-90**.

Table 3-90. ACECs, RNAs (ACECs), and other Special Management Designations – Alternative A

Special Designation	Acres	Relevant and Important Values	Management Direction
No Mans Mesa RNA (ACEC)	2,800	Educational, scientific, and research values	<ul style="list-style-type: none"> • Manage as unavailable for livestock grazing • Close to motorized OHV use • Prohibit campfires
<i>Total designated acreage</i>	<i>2,800</i>		

Source: BLM GIS 2022

Designating and protecting 2,800 acres as an RNA (ACEC) under Alternative A would contribute to GSENM’s goals of preservation of historic and scientific interests. However, the potential ACECs not designated would see their relevant and important values subject to potential impacts by not having specific management actions present. These could include not managing potential ACECs as VRM Class II, which would allow scenic and visual resources to be impacted through management activities including only partially retaining the existing character of the landscape and the level of change allowable to the characteristic landscape being moderate. Camping and campfires would continue being allowed in undesignated potential ACECs, which could lead to destructive fire impacts on all the identified relevant and important values. Recreational target shooting would continue being allowed, which could lead to trammeling of vegetation values. The undesignated potential ACECs would not be managed as ROW exclusion, opening the areas to ROW development, which could impact the paleontological, geological, scenic, cultural, vegetation, and scientific opportunity values through construction and development of ROWs. Scientific research would not be facilitated, which could prevent new discoveries. The undesignated potential ACECs would be available for livestock grazing, and coordinated monitoring plans would not be developed with grazing permittees, leading to potential impacts from livestock grazing such as trammeling of vegetation values and potential destruction of paleontological, geological, cultural, and scientific research values. The undesignated potential ACECs would not be closed to OHV use, which

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could lead to impacts from OHV use and increased recreational visitation, including trammeling of vegetation values and potential destruction of paleontological, geological, cultural, and scientific research values.

Alternative B

Under Alternative B, two ACECs and four RNAs (ACECs) would be designated, as shown in **Table 3-91**.

Table 3-91. ACECs, RNAs (ACECs), and other Special Management Designations – Alternative B

Special Designation	Acres	Relevant and Important Values	Management Direction
Warm Creek ACEC	10,800	Paleontological resources (significant vertebrate fossils)	<ul style="list-style-type: none"> No additional special management is needed. Management in Alternative B would provide sufficient protection.
Willis Creek ACEC	22,200	Unique geological features (slot canyons) and high scenic quality and sensitivity (Scenic Quality A and High Sensitivity ratings)	<ul style="list-style-type: none"> Manage as VRM Class II
Little No Mans Mesa RNA (ACEC)	50	Vegetation and scientific opportunity (undisturbed control area for research)	<ul style="list-style-type: none"> Manage as unavailable for livestock grazing Prohibit campfires Prohibit camping Manage as ROW exclusion Facilitate scientific research Prohibit recreational target shooting
Little Spring Point RNA (ACEC)	300	Vegetation and scientific opportunity (undisturbed and ungrazed control area for ecological research)	<ul style="list-style-type: none"> Manage as unavailable for livestock grazing Prohibit campfires Prohibit camping Manage as ROW exclusion Facilitate scientific research Prohibit recreational target shooting

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Special Designation	Acres	Relevant and Important Values	Management Direction
Fiftymile Mountain RNA (ACEC)	56,800	Cultural resources and scientific opportunity (significant prehistoric and historic sites)	<ul style="list-style-type: none"> • Allow camping by permit only • Manage as ROW exclusion • Develop coordinated monitoring plan with grazing permittees • Facilitate scientific research • Prohibit recreational target shooting
No Mans Mesa RNA (ACEC)	2,800	Vegetation and scientific opportunity (undisturbed control area for research)	<ul style="list-style-type: none"> • Manage as unavailable for livestock grazing • Close to motorized OHV use • Prohibit campfires • Facilitate scientific research • Prohibit recreational target shooting
<i>Total designated acreage</i>	<i>92,950</i>		

Source: BLM GIS 2022

Warm Creek Proposed ACEC is comprised of 10,800 acres and contains an array of unique geologic, paleontological, and wildlife resources. Many deep, remote, and incised canyons dominate the area. These roughly north-south trending canyon systems include Tibbet Canyon, Henry Canyon, Warm Creek, Smokey Hollow, Squaw Canyon, and portions of Wesses Canyon. Large, sweeping benches intermix with this labyrinth of canyons, including Nipple Bench, Henry Bench, and Tibbet Bench.

Fossil flora is extremely abundant in the area and has yielded specimens of dinosaurs, giant alligators, turtles, fish, and other large animal fossils of more than local significance. Unique geology also exists in the area, particularly the vast expanses of burned coal clinker outcrops and burning coal seams that give rise to the place name of “Burning Hills.” Designation of this area would protect paleontological resources.

Willis Creek Proposed ACEC is comprised of 22,200 acres and is located in the western reaches of GSENM, southwest of Cannonville and east of Bryce Canyon National Park. It is comprised of several disconnected areas to both sides the Skutumpah Road and collectively totals 22,200 acres. It is comprised of areas inventoried as having high quality scenery and as being highly sensitive to change in scenic quality or within the 5-mile viewshed of Bryce Canyon National Park, Scenic Byway 12, or Cottonwood Canyon Scenic Backway. There are significant paleontological resources found in this area, including remains of fish, turtles, crocodylians, dinosaurs, and mammals. Designation of this area would protect the unique geological features and high scenic quality and sensitivity. Management actions for this area would include VRM Class II.

Little No Mans Mesa RNA (ACEC), comprised of 50 acres, contains one of the very few areas of GSENM with an undisturbed intact vegetation community and the area affords novel opportunities for scientific investigation. Designation would protect vegetation and scientific opportunity. Management actions to

protect these resources would include prohibiting camping, campfires, and recreational target shooting, managing the area as ROW exclusion, and facilitating scientific research.

Little Spring Point RNA (ACEC), comprised of 40 acres contains one of the very few areas of GSENM with an undisturbed intact vegetation community and the area affords novel opportunities for scientific investigation. Designation would protect vulnerable vegetation and provide scientific opportunity. Management actions to protect these resources would include prohibiting camping, campfires, and recreational target shooting, managing the area as ROW exclusion, and facilitating scientific research.

Fiftymile Mountain RNA (ACEC), comprised of 56,800 acres, includes significant geologic, ecological, and cultural values, including a labyrinth of picturesque canyons, many of which contain important riparian ecosystems. The RNA (ACEC) contains the highest density of cultural sites within GSENM, and many are considered fragile, sensitive, and irreplaceable resources that are threatened and vulnerable to adverse change. A unique cultural melting pot, the area contains diverse scientific research opportunities for archaeological resources. Designation would protect these vulnerable cultural resources and provide scientific opportunity. Management actions to protect these resources include prohibiting recreational target shooting, allowing camping by permit only, managing the area as ROW exclusion, facilitating scientific research, and developing a coordinated monitoring plan with the grazing permittee to identify potential impacts from livestock grazing and including adaptive management thresholds in the applicable allotment management plans. See **Section 3.16**, Livestock Grazing, for more information on a coordinated monitoring plan.

Alternative B includes additional management actions for No Mans Mesa RNA (ACEC). Prohibiting campfires, closing the area to motorized OHV uses, and managing the area as unavailable to livestock grazing would continue as under Alternative A, with additional Alternative B management of prohibiting recreational target shooting, camping (unless authorized under a research permit), and facilitating scientific research. These two additional management actions under Alternative B would align RNA (ACEC) management not only with the management of the three other RNAs (ACECs) under Alternative B, but also with GSENM's goals of preservation of historic and scientific interest.

In total under Alternative B, 92,950 acres would be designated as ACECs and RNAs (ACECs), contributing to GSENM's goals of preservation of historic and scientific interests. Compared with Alternative A, an additional 90,150 acres (nearly 22 times more than under Alternative A) would be designated. All potential ACECs would be designated under Alternative B.

Alternative C

Under Alternative C, the two potential ACECs would not be designated, as shown in **Table 3-92**. Designated RNAs (ACECs) would be the same as under Alternative B. Management actions for the designated RNAs (ACECs) would be identical to those discussed under Alternative B.

Under Alternative C, 59,950 acres would be designated as RNAs (ACECs), contributing to GSENM's goals of preservation of historic and scientific interests. Compared with Alternative A, an additional 57,150 acres (14 times more than Alternative A) would be designated under Alternative C. However, two potential ACECs would not be designated under Alternative C. These areas' relevant and important values could be impacted by not having specific management actions present. These include not managing as VRM

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Table 3-92. ACECs, RNAs (ACECs), and other Special Management Designations – Alternative C

Special Designation	Acres	Relevant and Important Values	Management Direction
Little No Mans Mesa RNA (ACEC)	50	Vegetation and scientific opportunity (undisturbed control area for research)	<ul style="list-style-type: none"> • Manage as unavailable for livestock grazing • Prohibit campfires • Prohibit camping • Manage as ROW exclusion • Facilitate scientific research • Prohibit recreational target shooting
Little Spring Point RNA (ACEC)	40	Vegetation and scientific opportunity (undisturbed control area for research)	<ul style="list-style-type: none"> • Manage as unavailable for livestock grazing • Prohibit campfires • Prohibit camping • Manage as ROW exclusion • Facilitate scientific research • Prohibit recreational target shooting
Fiftymile Mountain RNA (ACEC)	56,800	Cultural resources and scientific opportunity (significant prehistoric and historic sites)	<ul style="list-style-type: none"> • Allow camping by permit only • Manage as ROW exclusion • Develop coordinated monitoring plan with grazing permittees • Facilitate scientific research • Prohibit recreational target shooting
No Mans Mesa RNA (ACEC)	2,800	Vegetation and scientific opportunity (undisturbed control area for research)	<ul style="list-style-type: none"> • Manage as unavailable for livestock grazing • Close to motorized OHV use • Prohibit campfires • Facilitate scientific research • Prohibit recreational target shooting
<i>Total designated acreage</i>	<i>59,950</i>		

Source: BLM GIS 2022

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Class II, which would allow scenic and visual resources to be impacted through management activities including only partially retaining the existing character of the landscape and the level of change allowable to the characteristic landscape being moderate.

Alternative D

No new ACECs or RNAs (ACECs) are included in Alternative D. The existing RNA (ACEC) (**Table 3-93**) would be managed similar to Alternative A, but would include the management actions (like Alternative B) of prohibiting recreational target shooting and facilitating scientific research.

Table 3-93. ACECs, RNAs (ACECs), and other Special Management Designations – Alternative D

Special Designation	Acres	Relevant and Important Values	Management Direction
No Mans Mesa RNA (ACEC)	2,800	Educational, scientific, and research values	<ul style="list-style-type: none"> • Unavailable for livestock grazing • Closed to motorized OHV use • Prohibit campfires • Facilitate scientific research • Prohibit recreational target shooting
<i>Total designated acreage</i>	<i>2,800</i>		

Source: BLM GIS 2022

Under Alternative D, 2,800 acres would be managed as an RNA (ACEC). Resources in this area would remain protected under GSENM’s objects of preservation of historic and scientific interests. Compared with Alternative A, there would be no change in designated special management area acres under Alternative D. However, because Alternative D restricts discretionary actions that could impact relevant and important values of potential ACECs, this alternative would provide substantially more protection than Alternative A.

Cumulative Impacts

Past and present actions in the cumulative impacts analysis area affecting ACECs, RNAs (ACECs), and other special management designations include grazing, recreation, and travel management. Effects from these actions include surface and vegetation disturbance, trammeling, and changes to the visual landscape that can affect the relevant and important values of paleontological resources, geological resources, visual resources, vegetation, cultural resources, and opportunity for scientific research. Effects on relevant and important values could occur quickly, but would likely recover slowly and would be irreparable in the case of some impacts on paleontological resources, cultural resources, and opportunities for scientific discovery.

Reasonably foreseeable future actions are likely to have similar effects as the past and present actions. Grazing, recreation, and travel management are expected to continue. Under Alternative A and C, these effects would continue to impact the identified relevant and important values for the undesignated potential ACECs. Under Alternative B, all potential ACECs would be designated, and relevant and important values would be protected and incremental effects on those values limited due to ACEC

management actions. Under Alternative D, in the undesignated potential ACECs, other resource management actions would be restrictive and therefore contribute to protecting relevant and important values. These include prohibiting recreational target shooting throughout GSENM, OHV closure or limitations to existing and designated routes, and ROW exclusion or avoidance. In Alternatives A, C, and D, due to the nature of GSENM designation, some, but not all, of the identified relevant and important values in undesignated potential ACECs would be protected through the identified objects of GSENM.

3.20.2 National Trails

National trails include congressionally designated historic and scenic trails and administratively designated recreation trails. Scenic trails are established “for maximum outdoor recreation potential, and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which such trails may pass” (BLM 2012c). Historic trails are “extended trails which follow as closely as possible and practicable the original route or routes of travel of national historical significance” and are designated for “the identification and protection of the historic route and its historic remnants and artifacts for public use and enjoyment” (BLM 2012c). National recreation trails are established for “a variety of compatible outdoor recreation uses in or reasonably accessible to urban areas or high-use areas” (BLM 2012d). While similar to historic and scenic trails, they are designated by the BLM and do not require congressional approval.

Affected Environment

Current Conditions

OSNHT, designated on December 4, 2002, by the Old Spanish Trail Recognition Act of 2002, is a 2,700-mile-long trade route extending from Santa Fe, New Mexico, to Los Angeles, California. It passes through Colorado, Utah, Arizona, and Nevada. The trail splits into three routes prior to entering Utah and continues through Utah within the planning area. The OSNHT was designated by a congressional act after the designation of GSENM by Presidential Proclamation in 1996. In 2012, the BLM released Manuals 6250, National Historic Trails Administration (BLM 2012c), and 6280, Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation (BLM 2012a). In 2016, the NPS and BLM, as co-administrators, published the OSNHT Final Comprehensive Administrative Strategy (BLM and NPS 2016) detailing procedures for this trail.

There are 38 miles of the Armijo Route, a segment of the OSNHT, within the decision area (**Figure 3-28, Scenic Routes, Appendix A**). Twenty-four miles of the OSNHT along the Armijo Route’s Box of the Paria segment are recognized as a “high potential route segment.” This term is used in the National Trails System Act for segments of a trail that afford high-quality recreation experiences along a portion of the route having greater-than-average scenic values or affording an opportunity to share vicariously the experience of the original users of a historical route (16 USC 1241, *et seq.*). To the east and west, the remaining 12 miles of the OSNHT cross and parallel U.S. Highway 89 and electrical distribution lines in the area formerly known as the KEPA.

The BLM OSNHT Corridor Inventory Project is currently underway and will provide further information on the trail segments and values.

Several other trails in GSENM are not currently designated; however, they have the potential for proposal as national recreation trails. These include the Hole-in-the-Rock Trail, Boulder Mail Trail, and Great Western Trail.

Trends

The OSNHT has historically been underutilized as a recreation and cultural resource. The trail was designated after GSENM designation; as a result, the 2000 MMP (BLM 2000) did not include up-to-date trail data or comprehensive management actions for the trail. The OSNHT has been growing in popularity over the past several years. A recent Recreation and Development Strategy was conducted by the Old Spanish Trail Association (NPS 2018). It identified numerous sites and locations for development along the trail. The availability of technology, such as apps and online mapping tools that follow and interpret the trail, is also becoming more popular; recreationists can find a trail resource and post information online, which instantly raises public awareness to the trail feature. Trail resources can be found and accessed without proper management protections in place. Additionally, increased levels of road and pipeline development along the OSNHT could impact the nature and purpose of the trail.

Forecasts

Use of the OSNHT will continue along current trends. Use of national recreation trails with the potential for designation will continue along current trends, pending BLM proposal and designation.

Environmental Consequences

Refer to **Section F.26**, Special Designations – National Trails, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would management affect the nature and purpose of the OSNHT?

Impacts Common to All Alternatives

Across all alternatives, there would be no changes in miles of designated OSNHT or its designation status.

Alternative A

Under Alternative A, the OSNHT would continue to be managed in accordance with the 2020 GSENM and KEPA RMPs (BLM 2020a and b, respectively). The BLM would continue to promote the preservation and appreciation of the OSNHT for the enjoyment of the American People by prohibiting discretionary uses that would substantially interfere with the nature and purpose of the OSNHT. The BLM would also allow discretionary uses compatible with the protection of the purpose and nature of OSNHT, as well as resources, qualities, values, and settings on the high-potential sites and segments.

The BLM would continue to manage the landscape and viewshed associated with the OSNHT so that visitors may gain a sense of how the landscape influenced commercial trade along the trail. This would be done by establishing an OSNHT management corridor along the Box of the Paria high-potential segment, with parameters to be determined after the completion of the OSNHT Corridor Inventory Project. These actions would maintain the nature and purpose of the trail and its corridor on high-potential segments, as well as the GSENM goals of preservation of historic and scientific interests.

The OSNHT Corridor Inventory Project is currently ongoing, and information from that report will be included for impacts analysis as available.

Alternatives B, C, and D

The OSNHT Corridor Inventory Project is currently ongoing, and information from that report will be included for impacts analysis as available.

Cumulative Impacts

Cumulative impacts will be identified and described when the OSNHT Corridor Inventory Project is complete.

3.20.3 Scenic Routes

Affected Environment

Current Conditions

National Scenic Byways

The National Scenic Byways Program is part of the U.S. Department of Transportation, Federal Highway Administration. The program was developed to help recognize, preserve, and enhance selected roads throughout the United States by designating certain roads as National Scenic Byway or All-American Roads based on their intrinsic qualities (archaeological, cultural, historical, natural, recreational, and scenic). To be designated a National Scenic Byway, a road must possess characteristics of regional significance within at least one of the intrinsic qualities. All-American Roads must possess characteristics of national significance in at least two of the intrinsic qualities. An All-American Road, Scenic Byway 12, occurs within the decision area, and is a 124-mile scenic byway. Scenic Byway 12 is one of only 40 All-American Roads in the United States and the only All-American Road in Utah. The BLM maintains the characteristics of the route as it crosses through GSENM (**Figure 3-28**, Scenic Routes, **Appendix A**).

All-American Road, Scenic Byway 12

From U.S. Highway 89 south of Panguitch, Scenic Byway 12 winds east through some of the most varied scenery in Utah. Beginning in Red Canyon, SR-12 traverses through the northern portion of Bryce Canyon National Park and Dixie National Forest; past Kodachrome Basin State Park; crossing over aspen-covered Boulder Mountain; and ending in Torrey, just 5 miles west of Capitol Reef National Park. Throughout its length, SR-12 passes within the decision area several times. In addition, the byway's scenic viewshed includes BLM-managed lands away from the roadway.

Utah Scenic Backways

State Scenic Backways have been designated by state declaration for their scenic, historical, and recreational qualities, but are roads that do not generally meet federal safety standards for safe year-round travel by passenger cars. Backways often require four-wheel-drive vehicles, and road conditions can vary due to season and weather. There are seven Utah Scenic Backways in the decision area (**Figure 3-28**, Scenic Routes, **Appendix A**):

Burr Trail Road

The Burr Trail is one of the most picturesque drives in Utah. Paved and graded, this gravel and dirt road extends from Boulder to Bullfrog Marina passing through GSENM for 30 miles before crossing into Capitol Reef National Park and then into Glen Canyon. Burr Trail Road also connects with Notom Road in the Waterpocket Fold backcountry of Capitol Reef National Park.

Hole-in-the-Rock Road

This route begins 5 miles east of the town of Escalante off Scenic Byway 12. It is a 62-mile road that follows the general route of the pioneer Hole-in-the-Rock Expedition to search for a route across the Colorado River (what is now Lake Powell). The last 5 miles of the road are within the boundaries of Glen Canyon. Devil's Garden, Dance Hall Rock, and Dry Fork Slot Canyons are popular day-use destinations along this route. It also provides access to many popular overnight routes in the Escalante Canyons.

Posey Lake Road

This 40-mile backway heads north from the town of Escalante and climbs Escalante Mountain in Dixie National Forest. It provides access to Posey Lake and Posey Lake Campground, as well as many Forest Service roads ideal for exploring by an OHV or mountain bike. It borders the Escalante Canyons Unit for the first 8 miles out of Escalante.

Smoky Mountain Road

This backway winds for 78 remote miles connecting Scenic Byway 12 and U.S. Highway 89. It offers unparalleled views of Navajo Mountain and the Kaiparowits Plateau as it passes through stretches of GSENM. Travelers along the backway can occasionally see smoke smoldering from 100-year-old coal fires deep beneath the aptly named Smoky Mountain.

Cottonwood Canyon Road

The 47-mile Cottonwood Canyon Road connects Scenic Byway 12 in Cannonville with U.S. Highway 89 to the south between Kanab and Big Water. It passes Kodachrome Basin State Park and offers numerous opportunities to explore GSENM, ranging from short hikes to backpacking excursions. Popular destinations include Cottonwood Narrows and Grosvenor Arch. Approximately 35 miles of the backway pass through GSENM.

Paria River Valley Road

This short track descends from the junction with U.S. Highway 89 (milepost 31) into a valley with the remains of the Paria ghost town and the site of a 1930s movie set; both are surrounded by colorful rocks. The road is 6 miles long and becomes steep and twisting near the end, as it crosses the undulating banded hills that cover this area.

Johnson Canyon/Alton Road

This 32-mile scenic route begins 9 miles east of Kanab on U.S. Highway 89 and heads north, rejoining U.S. Highway 89 at Glendale. An alternate route extends north to Alton, 9 miles north of Glendale. The backway travels through the western part of GSENM, partially along GSENM's boundary.

BLM Back Country Byways

The BLM developed its Back Country Byway Program to complement the National Scenic Byways Program. These byways highlight the spectacular nature of western landscapes. Back Country Byways vary from narrow, graded roads, passable only during a few months of the year, to two-lane paved highways providing year-round access. There are no BLM Back Country Byways or BLM backways in the planning area.

Trends

Travel along scenic routes has increased in the last 20 years, particularly along certain routes like Hole-in-the-Rock Road. During that same time, the development of new or the improvement of existing recreational infrastructure along most scenic routes has occurred. The nonpaved scenic routes are being travelled by an increasing mix of vehicle types (such as cars, trucks, 4x4s, camper vans, and UTVs). Additionally, climate change effects, such as increased flooding events and impacts on biodiversity, are occurring throughout the routes and their viewsheds.

Forecasts

Existing scenic route designations are expected to remain. Travel is forecast to increase along all scenic routes in correlation with tourism and recreational visitation increases in the area. More recreational infrastructure is forecast to be developed along most of the scenic routes. The wide mix of vehicle types using scenic routes is forecast to continue.

Environmental Consequences

Refer to **Section F.27**, Special Designations – Scenic Routes, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would management impact the viewshed surrounding scenic routes and the experience of enjoying scenic routes within the planning area?

Impacts Common to All Alternatives

Under all alternatives, scenic routes would be authorized through implementation actions for reasonable and necessary improvements to support safe passage. Improvements would be consistent with protecting GSENM objects. There would be no new designations or changes of route miles of scenic routes. Designated scenic routes, as shown in **Table 3-94**, would remain unchanged across alternatives.

Table 3-94. Designated Scenic Routes included in All Alternatives

Route	Length (miles)	Designation
Scenic Byway 12	32	All-American Road
Burr Trail Road	30	Utah Scenic Backway
Hole-in-the-Rock Road	45	Utah Scenic Backway
Posey Lake Road	3	Utah Scenic Backway
Smoky Mountain Road	62	Utah Scenic Backway
Cottonwood Canyon Road	35	Utah Scenic Backway
Paria River Valley Road	5	Utah Scenic Backway
Johnson Canyon/Alton Road	6	Utah Scenic Backway

Source: BLM GIS 2022

Alternative A

Under Alternative A, designated scenic routes would continue to be managed to protect the values for which they were established. Under Alternative A, there would be no management of the viewshed as seen from the designated scenic routes. Impacts within the viewshed from surface development or disturbance would continue. This could result in changes to the overall enjoyment of the routes from the American public.

The BLM would continue to consider currently designated Utah Scenic Backways as Scenic or Backcountry Byways, which would maintain and manage the values for which they were established. The BLM would not consider new BLM Back Country Byways, which could mean loss of potential values of future BLM Backways. However, GSENM goals include preservation of historic and scientific interests, which may lead to the protection of those potential values regardless of BLM Backway designation.

Alternatives B and C

Under Alternatives B and C, designated scenic routes would be managed to protect and enhance the values for which they were designated, the same as under Alternative A. However, under Alternatives B and C, designated scenic byway status would be considered for the seven Utah Scenic Backways and Skutumpah Road. This designation would include identifying a route corridor and protecting the viewshed from destructive management activities. Additionally, VRM Class II management actions would be applied to the foreground/midground distance zones for all designated scenic byway. VRM Class II management actions would include retaining the existing character of the landscape, meaning that the level of change to the landscape would be low. This would protect the viewshed and allow for the overall enjoyment of the designated scenic byway by the American public. Additionally, management activities may be seen but should not attract the attention of the casual observer, and any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. More information on VRM Class II management can be found in **Section 3.10**, Visual Resources.

When compared with Alternative A, Alternatives B and C would include the potential for consideration of new scenic byways. This could lead to new designations, which would increase the total acreage managed as VRM Class II.

Alternative D

Under Alternative D, designated scenic byways would be managed similar to Alternatives B and C; however, viewsheds would not be designated by the foreground or middleground zones, but would instead be designated by a 5-mile corridor from the byway centerline. This corridor would be managed as VRM Class II, like Alternatives B and C (with low levels of change to the landscape). The extent of the 5-mile corridor would include the majority of the foreground and middleground zones and would extend 5 miles. This would provide additional protections of the viewshed.

Compared with Alternative A, Alternative D would include the potential for consideration of new scenic byways. This could lead to new designations, which would increase the total acreage managed as VRM Class II.

Cumulative Impacts

Past and present actions in the cumulative impact analysis area affecting scenic byways include actions that impact viewsheds due to surface disturbance, including mineral exploration and development, recreation activities, and OHV use.

Alternative D would contribute the least to overall adverse cumulative impacts on designated scenic byway because it provides the greatest protections of the routes' viewsheds. Alternative A would contribute the most to cumulative impacts because it would include the least protections of the routes' viewsheds.

3.20.4 Mormon Pioneer National Heritage Area (Boulder Loop and Under the Rim Districts)

Affected Environment

Current Conditions

National Heritage Areas are places where historic, cultural, and natural resources combine to form cohesive, nationally important places. National Heritage Areas are large, lived-in landscapes and, consequently, involve collaborating with communities to determine how to make heritage relevant to local interests and needs.

Congress established the Mormon Pioneer National Heritage Area in 2006 to preserve “the rich heritage and tremendous achievements of the Mormon Pioneers.” In 2010, a management plan was finalized and has been used to fund restoration and revitalization projects in the heritage area (NPS 2010). Two of the five districts of the National Heritage Area are included in GSENM. The Boulder Loop District includes Scenic Byway 12 in the northern portion of GSENM, while the Under the Rim District includes U.S. Highway 89 in the southern portion of GSENM. Both districts and routes are shown on **Figure 3-53**, National Heritage Area, in **Appendix A**.

Trends

The cultural, historic, and natural resources identified for protection by the Mormon Pioneer National Heritage Area can be affected by increased visitation and damage from overuse and improper use. Climate change impacts can affect values across the area through increased temperature and increased threat of high-intensity wildland fire, leading to complete destruction of resources.

Forecasts

The existing National Heritage Area designation is forecast to remain, pending congressional action.

Environmental Consequences

Refer to **Section F.28**, Special Designations – Mormon Pioneer National Heritage Area (Boulder Loop and Under the Rim Districts), in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would management impact the cultural, historic, and natural resources for which National Heritage Areas were designated?

Impacts Common to all Alternatives

No alternatives would alter the management of the designated Mormon Pioneer National Heritage Area. The BLM would continue to manage the area to protect the cultural, historic, and natural resources for which the area was designated. However, differences in VRM and ROW management across the alternatives could impact the area through management of visual and scenic resources viewable within the Mormon Pioneer National Heritage Area.

Cumulative Impacts

Due to the relatively small percentage of the Mormon Pioneer National Heritage Area that overlaps with GSENM, incremental impacts of implementing each alternative in this RMP would not impact the National

Heritage Area or the values for which it was designated. Actions on BLM-managed lands would largely serve to protect the physical elements and scenic quality in the viewshed of the routes located within the two districts of the National Heritage Area.

3.20.5 Wild and Scenic Rivers

WSRs are streams or segments of streams designated by Congress under the authority of the WSR Act of 1968 (Public Law 90-542, as amended; 16 USC 1271–1287) for the purpose of preserving the stream or stream section in its free-flowing condition, preserving water quality, and protecting its outstandingly remarkable values (ORVs). ORVs are identified on a segment-specific basis and may include scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values. Section 5(d)(1) of the WSR Act directs federal agencies to consider potential WSRs through their land use planning process.

During planning efforts, the BLM reviews all streams within its jurisdiction and evaluates their eligibility, suitability, and tentative classification. The three types of tentative classifications for eligible river segments are wild, scenic, and recreational. The tentative classification is based on the degree of human development currently along an eligible river and is used as a guide for future management activities. Wild rivers are rivers free of impoundments and generally inaccessible except by trails, with watersheds or shorelines essentially primitive and waters unpolluted. Scenic rivers are free of impoundments, with shorelines or watersheds still largely undeveloped but accessible in places by roads. Recreational rivers are readily accessible by road and may have some developments or impoundments or diversions in the past.

Affected Environment

Current Conditions

Beginning in 1994, BLM interdisciplinary teams gathered eligibility information regarding all river segments and watersheds in the Escalante and Kanab resource areas. In cooperation with the adjacent federal agencies, the eligibility study area was expanded during the development of the 2000 MMP (BLM 2000) to include river segments that extended into Dixie National Forest, Bryce Canyon National Park, and Glen Canyon. That way, the entire watersheds were evaluated for eligible segments. Eligible river segments are described in the 2000 Wild and Scenic Eligibility Findings and the GSENM Final EIS (BLM 2000, Appendix 4).

All streams determined eligible were then assessed for suitability as part of the 2000 MMP. In total, 224.1 miles of the Escalante and Paria River systems within the decision area were deemed suitable for inclusion in the National Wild and Scenic Rivers System. The BLM is managing these river corridors (0.25 miles above the mean high-water mark on either side of the river) to prevent degradation of the free-flowing condition, water quality, identified ORVs, and the tentative classification assigned to each segment (BLM 2000, Appendix 4). Management of these segments will continue as such until determinations on designation are made by Congress. Suitable river segments are identified in **Table 3-95** and **Figure 2-39**, Alternative A: Wild and Scenic Rivers, in **Appendix A**. Changed circumstances have not been identified since the original 2000 MMP eligibility and suitability studies. There are currently no congressionally designated WSRs within GSENM.

Through this land use planning process, a recommendation package consisting of the suitability determinations will be provided to the U.S. Department of the Interior and Congress. Any determinations on WSR designation will be made through congressional action.

Table 3-95. Suitable Wild and Scenic River Segments

Suitable Segment	Tentative Classification	Length (miles)
Escalante River System		
Escalante River #1	Wild	13.7
Escalante River #2	Recreational	0.3
Escalante River #3	Wild	19.2
Harris Wash	Wild	1.1
Lower Boulder Creek	Wild	13.5
Lower Deer Creek #1	Recreational	2.0
Lower Deer Creek #2	Wild	7.0
Lower Sand Creek	Wild	10.6
Mamie Creek and West Tributary	Wild	9.2
Slickrock Canyon	Wild	2.8
Steep Creek	Wild	6.4
The Gulch #1	Wild	11.0
The Gulch #2	Recreational	0.6
The Gulch #3	Wild	13.0
Willow Patch Creek	Wild	2.6
Death Hollow Creek	Wild	9.9
Calf Creek #1	Wild	3.5
Calf Creek #2	Scenic	3.0
Calf Creek #3	Recreational	1.5
Twentyfive Mile Wash	Wild	6.8
Paria River System		
Upper Paria River #1	Recreational	21.7
Upper Paria River #2	Recreational	14.4
Lower Paria River #1	Recreational	3.3
Deer Canyon Creek	Wild	5.2
Snake Creek	Wild	4.7
Hogeye Creek	Wild	6.3
Kitchen Canyon	Wild	1.3
Starlight Canyon	Wild	4.9
Lower Sheep Creek	Recreational	1.5
Hackberry Creek	Wild	20.1
Lower Cottonwood Creek	Recreational	1.6
Total		224.0

Source: BLM GIS 2022

Short segments of Scorpion Gulch, Fools Canyon, Coyote Gulch, and Willow Gulch may occur on BLM-managed lands within GSENM. The NPS will manage these segments, and suitability recommendations will be made with the remainder of the named segments by Glen Canyon (BLM 2000, Appendix 4).

Trends

The ORVs identified in the suitable river segments in **Table 3-95** include scenic, recreational, historical, cultural, geological, fish, wildlife, and paleontological values. Increased visitation and damage from overuse and improper use within the river segments and corridors can affect these values. Climate change impacts can also affect values across these waterways, including viewsheds, fish and wildlife habitat, vegetation, recreation opportunities, invasive species, and vegetation conversion through increased temperatures and increased threat of high-intensity wildland fire, leading to destruction of some resources.

Forecasts

The free-flowing condition, water quality, ORVs, and tentative classification of suitable rivers segments are forecast to remain unchanged, pending congressional action.

Environmental Consequences

Refer to **Section F.29**, Special Designations – Wild and Scenic Rivers, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would management affect the free-flowing condition, water quality, ORVs, and tentative classification of river segments found suitable for inclusion in the National Wild and Scenic Rivers System?

Impacts Common to All Alternatives

Across all alternatives, segments determined eligible or suitable for inclusion in the National Wild and Scenic Rivers System would be managed according to BLM Manual 6400 (BLM 2012b). Additionally, identified ORVs, free-flowing status, tentative classifications, and water quality would continue to be protected and managed for, pending congressional action.

Alternative A

Managing suitable segments (**Table 3-95**) would preserve their free-flowing condition, water quality, identified tentative classification, and ORVs. Suitable segments would be managed as ROW avoidance, except in designated utility corridors. Additionally, suitable segments within WSAs would be managed as VRM Class I, which includes preserving the existing landscape character. This VRM class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. More information on VRM Class I management can be found in **Section 3.10**, Visual Resources. Each suitable segment's free-flowing condition, tentative classification, and ORVs would be retained.

Managing the eligible segments (Scorpion Gulch, Fools Canyon, Coyote Gulch, and Willow Gulch) would preserve their free-flowing condition, water quality, identified tentative classification, and ORVs until a determination of their suitability can be made with Glen Canyon.

Alternative B

Under Alternative B, the same 224 miles as under Alternative A would be suitable. The only difference between Alternatives A and B is that, under Alternative B, the classifications of two suitable segments (Upper Paria River #1 and Lower Sheep Creek) would change from recreational to wild. This change would revert the segments to their original classifications, as determined in the 2000 MMP (BLM 2000). These segments and their changes are identified in **Table 3-96**. Suitable segments with wild classifications would be managed as ROW exclusion, and segments with scenic and recreational classifications would be managed as ROW avoidance, except in designated utility corridors. Segments with wild classifications and all suitable segments within WSAs would be managed as VRM Class I. These management actions would lead to a higher level of protection of visual and scenic resources within the designated wild corridors,

Table 3-96. Suitable Wild and Scenic River Segment Changes under Alternative B

Suitable Segment	Length (miles)	Tentative Classification under Alternative A	Tentative Classification under Alternative B
Paria River System			
Upper Paria River #1	21.7	Recreational	Wild
Lower Sheep Creek	1.5	Recreational	Wild
Total	23.2		

Source: BLM GIS 2022

compared with Alternative A. With the 23.2-mile increase of suitable segments classified as wild under Alternative B, more acreage and river miles would be protected from developments and ROWs than under Alternative A.

Under Alternative B, scenic or recreational segments outside of WSAs would be managed as ROW avoidance, except in designated utility corridors, and would be managed as VRM Class II. VRM Class II requires retaining the existing character of the landscape, meaning the level of landscape change is low. Additionally, management activities may be seen but should not attract the attention of the casual observer, and any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. More information on VRM Class II management can be found in **Section 3.10**, Visual Resources. Compared with Alternative A, Alternative B would provide increased protection of visual and scenic resources throughout all suitable segments and corridors.

Alternative C

Under Alternative C, classifications and miles of suitable segments, as well as assigned VRM classes, would be the same as under Alternative B. However, suitable segments with wild classifications would be managed as ROW exclusion in the outback and primitive areas, and suitable segments with scenic and recreational classifications would be managed as ROW avoidance, except in designated utility corridors. The change in area managed as ROW exclusion within wild corridors would provide increased protections of visual and scenic resources, compared with Alternative A.

Alternative D

Under Alternative D, classifications and miles of suitable segments, as well as assigned VRM classes, would be the same as under Alternative B. However, suitable segments, regardless of classification, would be managed as ROW exclusion, except in designated utility corridors. The change in area managed as ROW exclusion would provide increased protection of visual and scenic resources, compared with Alternative A.

Cumulative Impacts

Past and present actions in the cumulative impacts analysis area affecting suitable WSRs include grazing, ROW development, recreation, and travel management. Impacts from such actions could affect the identified ORVs and tentative classification of segment corridors through surface disturbance and developments that would impact segments' free-flowing character and water quality.

Alternative D would provide the greatest protection of suitable WSR segments and would therefore contribute the least to overall cumulative impacts. Alternatives B and C would provide more protection

than Alternative A, which would provide the least protections of suitable segments and would therefore contribute the most to cumulative impacts.

Climate changes impacts could affect the identified ORVs through increased stream temperatures, increased severe wildland fire, degradation of vegetation resources, and impacts on scenery resources.

3.20.6 Wilderness Study Areas

With the passage of the FLPMA in 1976, Congress directed the BLM to inventory, study, and recommend which public lands under its administration should be designated as wilderness. The Utah Statewide Wilderness Study Report, published in October 1991 (BLM 1991), reported the results of the study in Utah and made recommendations to Congress about which areas should be designated as wilderness. The final recommendations for wilderness designation were forwarded to Congress on June 22, 1992. Congress has not yet acted on the recommendations.

Section 603(c) of the FLPMA provides direction to the BLM on the management of WSAs. It states that, with some exceptions, “the Secretary shall continue to manage such lands according to his authority under this Act and other applicable law in a manner so as not to impair the suitability of such areas for preservation as wilderness.” This language is referred to as the “nonimpairment” mandate. ISAs are primitive or natural areas that existed at the passage of the FLPMA and were identified under the FLPMA for accelerated wilderness review. They are managed the same way as WSAs.

Affected Environment

Current Conditions

Sixteen WSAs and ISAs are present in the decision area (**Figure 2-41**, Alternatives A, B, C, and D: Wilderness Study Areas, in **Appendix A**). A description of wilderness characteristics and other resource values and uses found in each WSA and ISA can be found in the Utah Statewide Wilderness Study Report (BLM 1991). These 16 WSAs and ISAs account for 881,100 acres (47 percent) of the decision area (**Table 3-97**).

Table 3-97. Wilderness Study Areas and Instant Study Areas

WSA/ISA Name	Acres
Burning Hills WSA	62,500
Carcass Canyon WSA	47,400
Death Ridge WSA	62,400
Devils Garden ISA	600
Escalante Canyons Tracts ISA	1,200
Fiftymile Mountain WSA	148,500
Mud Spring Canyon WSA	38,200
North Escalante Canyons Tracts 1, 5/The Gulch ISA	119,800
Paria/Hackberry	136,800
Paria/Hackberry 202 WSA	400
Phipps-Death Hollow ISA	42,700
Scorpion WSA	36,000
Steep Creek WSA	22,000
The Blues WSA	18,800
The Cockscomb WSA	9,900

WSA/ISA Name	Acres
Wahweap WSA	133,900
Total	881,100

Source: BLM GIS 2022

Pursuant to the BLM’s nonimpairment standard, the BLM manages WSAs to prevent impairment of the suitability of such areas for preservation as wilderness, until Congress passes legislation to either designate them as part of the National Wilderness Preservation System or release them from further study or protection. Activities permissible within WSAs include temporary uses that create no new surface disturbance and do not involve permanent placement of structures. Temporary, non-disturbing activities, as well as valid existing rights or activities that meet the exception to the nonimpairment standard (described in Section 1.6.C.2 of BLM Manual 6330; BLM 2012d), may generally continue in WSAs.

Most WSAs in the decision area also contain inholdings that were formerly managed by the State of Utah School and Institutional Trust Lands Administration and have since been acquired by the BLM. The Utah Schools and Lands Exchange Act of 1998 involves lands acquired and managed by GSENM. Because this was a legislative exchange, the FLPMA land exchange regulations at 43 CFR 2200.0-6(f) and (g) and 43 CFR 2201.9(b) do not apply. In addition, none of the lands acquired through the Utah Schools and Lands Exchange Act of 1998 fit any of the categories of land to which the *Utah v. Norton* settlement does not apply as provided in BLM Instruction Memorandum 2003-275 – Change I²⁹. Although the Utah Schools and Lands Exchange Act of 1998 ratified an agreement between the Secretary of the Interior and the Utah Governor to exchange lands, both the agreement and the act itself are silent regarding how lands acquired by the BLM within existing WSAs are to be managed. Therefore, none of the lands acquired by the United States through the Utah Schools and Lands Exchange Act of 1998 are WSAs or managed as WSAs.

Trends

Visitation to GSENM has steadily increased since the successful 2013 Mighty Five tourism campaign, which highlighted five national parks (Zion, Arches, Capital Reef, Canyonlands, and Bryce Canyon) surrounding GSENM. With visitation numbers increasing, threats to WSAs and ISAs include improper OHV usage, illegal incursions into WSAs and ISAs, campsite proliferation, trail widening or braiding, trash, soil and vegetation disturbance, and graffiti defacing WSA and ISA features.

Forecasts

WSAs are forecast to remain as currently designated and managed, pending congressional action.

Environmental Consequences

Refer to **Section F.30**, Special Designations – Wilderness Study Areas, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would management actions affect the nonimpairment standard in of WSAs?

²⁹BLM Instruction Memorandum 2003-275 – Change I refers to the BLM Instruction Memorandum providing guidance regarding the consideration of wilderness characteristics in the land use planning process. It set forth policy to comply with *Utah v. Norton* and applied the terms Bureau-wide, excluding Alaska.

Impacts Common to All Alternatives

Under all alternatives, the 16 WSAs and ISAs would remain designated with no change to their size (**Table 3-97**). Subject to valid existing rights and grandfathered uses, WSAs and ISAs would continue to be managed as VRM Class I, ROW exclusion, closed to OHV use, and to prohibit off-route parking. Suitability of each designated WSA and ISA for wilderness designation would not be impacted or impaired.

Alternative A

If a WSA or ISA, in whole or in part, is released from wilderness consideration, the area would continue to be managed in accordance with the RMP goals, objectives, and management prescriptions, unless otherwise specified by Congress in its releasing legislation. Proposals for released areas would be examined on a case-by-case basis, but all actions that are inconsistent with RMP goals, objectives, and prescriptions would be deferred until an RMP amendment is completed. Wilderness characteristics inventories would not have to be completed prior to release, which could mean a potential loss of wilderness characteristics on lands that have not been previously inventoried.

Alternatives B, C, and D

WSAs and ISAs would be managed so that if any were released from wilderness consideration, in whole or in part, past management of the released lands would continue, unless otherwise specified by Congress in its releasing legislation, in a manner that would ensure GSENM objects are protected. For the areas released from wilderness consideration and not designated as wilderness, re-inventories of wilderness characteristics would be required, and no proposals or actions would occur in those areas unless consistent with the protection of GSENM objects or for public health and safety. Compared with Alternative A, this would ensure that the current status of wilderness characteristics would be identified and that management of the released areas and any proposals or actions occurring in them would be consistent with the protection of GSENM objects or for public health and safety. However, this could lead to impacts not protected under GSENM objects, such as surface disturbances impacting the naturalness and outstanding opportunities for solitude or primitive and unconfined types of recreation and supplemental values that would have previously been protected by WSA or ISA status.

Cumulative Impacts

Past and present actions in the cumulative impacts analysis area affecting WSA and ISA units and their associated wilderness characteristics include grazing, recreation, and travel management, as these can impact the naturalness and outstanding opportunities for primitive and unconfined recreation that make these WSAs and ISAs eligible for wilderness designation. Management actions to protect GSENM designated objects and values would largely serve to protect the wilderness characteristics of these units.

3.20.7 References

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3.21 SOCIAL AND ECONOMIC VALUES

The following subsections discuss current conditions, trends, and forecasts of socioeconomic values associated with uses of BLM-managed lands for the socioeconomic analysis area (Kane and Garfield Counties, Utah), and, where available, the decision area. The counties in the analysis area were chosen because GSENM is located in these counties, and any economic or social impacts from the BLM's management decisions would largely occur in these counties. The discussion focuses on information that is most relevant to the scope of the current BLM planning effort for GSENM.

3.21.1 Affected Environment

Current Conditions

Kane and Garfield Counties are among the most rural counties in Utah. Historically, these counties have predominately relied on farm and ranching, construction, and tourism and recreation-related industries for local employment, income, and economic output.

Social and geographic groups around GSENM are affected by management of BLM-managed lands in varying ways. Residents, visitors, commercial users, traditional or subsistence users, Tribes, and interest-based or place-based groups have distinct sets of attitudes, beliefs, values, opinions, and perceptions about BLM-managed public resources and the effects of various management policies and actions. These views reflect different cultural and economic linkages that people have with BLM-managed lands. Communities of shared interest are organizations and groups of individuals who have common interests in the use and management of BLM-managed public resources; many organizations or groups of individuals may belong to or share values with more than one communities of interest. Different types of communities of interest have distinct sets of attitudes, beliefs, values, opinions, and perceptions about BLM-managed public resources and the effects of various management policies and actions. These views reflect different cultural and economic linkages that people have to BLM-managed lands.

Tribes are federally recognized sovereign nations who value GSENM for its cultural and spiritual significance. For these communities, protecting cultural resources, combined with maintaining access to traditional cultural sites, is extremely important. These cultural sites include areas of past occupation and also areas where traditional practices, such as plant gathering and woodland harvest, have occurred. The cultural importance of springs, lakes, and rivers is well documented for the Tribal Nations in and around GSENM (Sabata 2018). See **Section 3.7**, Tribal Interests, for more details. Other groups and individuals with interests in archaeology and history also value cultural resources, though these should not be conflated with the unique relationships and responsibilities upheld by the BLM with Tribal Nations.

Habitat and resource conservation communities of interest are organizations and groups of individuals who have a number of conservation objectives, but most believe broadly that protecting at-risk species and maintaining habitats and ecosystems for all species are fundamental values that should be a high priority in public policy (Brown et al. 2015). Most believe in the intrinsic value of wildlife, well-functioning ecosystems, and pristine areas. Some advocate resource conservation for human and wildlife needs, pointing to the beauty and solitude values of unspoiled areas in the planning area. For example, some conservation communities of interest highly value preserving dark skies by reducing light pollution and excessive artificial light that diminishes the visibility of the stars and can negatively impact wildlife and the environment. Additional resource conservation topics that may be of interest to these communities include water, air, soil resources, and vegetation and riparian zone management. Persons and organizations

concerned with protecting paleontological, cultural, and historic sites also generally fit into this category of resource conservation communities.

Recreation communities of shared interest are organizations and individuals who value the region for its recreational opportunities. Many recreation communities of shared interest seek protection of areas with high recreational values for current and future generations can enjoy these values and increase knowledge or training in the type of recreation they pursue, whether it is mountain biking, rafting, hunting, OHV riding, or another type of recreation. Some recreation communities of shared interest believe the region has benefited from tourism, and recreation is a primary economic driving force (Matz 2017). They point out how expenditures by recreators help support local businesses, provide local jobs and income, and generate sales taxes and other public revenues. They maintain that the recreation and tourism industry has proven a stable and an increasing economic engine for the area (Matz 2017). Many recreationists believe in maintaining habitat and ecosystem values because it often increases recreational values. These recreation communities typically believe that resource development and new roads have permanent impacts on recreational values, and they see it as antithetical to the objective of protection of recreational areas (Brown et al. 2015). For many recreation communities, preservation of natural soundscapes and dark skies is also important to provide users with adequate opportunities for quiet recreation and better views of the night sky. However, these views on preserving ecosystems for recreational use often conflict with the views of habitat and resource conservation communities. These conflicting views create challenges for developing land use policies (Thomas and Reed 2019). See **Section 3.17**, Recreation, for more information on recreation use in GSENM.

Groups of individuals who identify as being part of visual resource communities of shared interest focus on the area's scenic qualities. Although they share many of the perspectives of habitat and resource conservation communities and recreation communities, they emphasize the role of visual resources as the fundamental asset underlying both direct recreational use of public lands and general tourism in the region (Brown et al. 2015). They believe the scenic quality of the landscape in and around the planning area is world renowned. They also believe the national parks and other federally and state-managed lands are a huge economic draw to southern Utah and the area in and around the planning area because of their scenic qualities. Dark skies are also valuable to visual resource communities. Based on this view of visual resources as a unique and valuable asset, these communities emphasize that the visual integrity of the area needs to be maintained. See **Section 3.10**, Visual Resources, and **Section 3.11**, Dark Night Skies, for more details.

Intertwined with the above communities of shared interest are local residents. Some residents of Garfield and Kane Counties seek to preserve the historical agricultural setting of the community and are reluctant to embrace change in the form of increased recreation and tourism. They are concerned about changes in the character of the community. They also are concerned about increased demands on local government services and infrastructure. Some local Tribes are concerned that the increase in recreation may lead to adverse impacts on cultural and spiritual resources. Other residents welcome the opportunities that increased recreation and tourism may provide. These opportunities could be in the form of increased employment and earnings, including increased business opportunities. These could include increased opportunities for BLM-permitted activities, such as guiding and outfitting services. Some residents see increased fiscal revenues for local governments through tourism-related taxes.

Table 3-98 shows the basic demographic makeup within the socioeconomic analysis area and Utah. Garfield County has a population of about 5,000 people, and Kane County has a population of almost 8,000 people. Within counties in the socioeconomic analysis area, per capita, median, and mean incomes generally are reported as lower than those for Utah, except for per capita income in Kane County, which is higher than in the other areas of comparison. This may be due to a smaller household size. As is true nationally, nonlabor income is a significant portion of total personal income in Garfield and Kane Counties; however, it is a lower share in Utah as a whole. This is likely because the state has an overall younger median age and likely a larger share of the population in the workforce (**Table 3-99**).

Table 3-98. Population Demographics and Household Income (2020)

Geography	Population	Median Age	Per Capita Income (\$)	Median Household Income (\$)	Mean Annual Household Income (\$)
Garfield County	5,050	42.0	23,926	44,279	61,633
Kane County	7,914	42.0	47,192	50,517	60,030
Utah	3,249,879	30.3	30,986	74,197	93,010

Source: U.S. Department of Commerce 2022

Table 3-99. Components of Household Income (2020)

Geography	Labor Earnings (%)	Dividends, Interest, and Rent (%)	Age-related Transfer Payments (%)	Hardship-related Payments (%)	Other Transfer Payments (%)
Garfield County	52.0	14.9	7.0	3.4	2.5
Kane County	51.2	23.7	15.8	4.4	5.0
Kane and Garfield two-county region	51.5	21.9	15.2	5.3	6.1
Utah	64.5	20.2	7.1	4.0	4.2

Source: U.S. Department of Commerce 2021

Table 3-100 shows poverty rates for different categories of the population. These rates vary across the socioeconomic analysis area and the comparison region. In general, poverty rates are higher in Garfield and Kane Counties than in the state. When evaluated by race and ethnicity, poverty rates within the analysis area are similarly complex and varied. No clear patterns emerge when compared with the United States. This is an indication that economic conditions in the analysis area do not uniformly mirror national trends or statistics. However, poverty rates for certain categories within the analysis area are markedly higher than the poverty rates for Utah.

Table 3-101 shows total employment by industry in 2020 for both counties and for Utah. Due to the small populations of the two counties, much of the sector data are estimates to protect smaller firms from disclosure requirements. As is the case in most of the nation, service-related jobs dominate those in nonservice-related sectors. In both counties, accommodations and food services are the largest employers, followed by government. The large accommodations and food services industry is indication of the importance of tourism and recreation on the local economies around GSENM.

Table 3-100. Percentage of People in Poverty (2020)

Percentage of People Who are Below the Poverty Line	Garfield County (%)	Kane County (%)	Kane and Garfield Two-County Region (%)	Utah (%)
People	16.4	13.1	14.4	9.1
Families	11.3	6.0	8.3	6.3
People under 18 years	24.5	12.7	13.1	9.9
People 65 years and older	13.3	5.5	7.3	6.2
Families with related children under 18 years	22.4	8.3	10.7	11.7
Married couple families	4.4	4.4	4.8	8.7
Married couple families with children under 18 years	8.2	3.6	7.7	4.0
Female householder, no spouse present	52.9	21.2	24.1	4.9
Female householder, no spouse present with children under 18 years	69.0	29.9	32.6	20.3

Sources: U.S. Department of Commerce 2022, 2021

Table 3-101. Jobs by Industry (2020)

Type of Industry	Industry	Garfield County	Kane County	Kane and Garfield Two-County Region	Utah	
Total	Total number of jobs	3,253	5,232	8,485	2,079,706	
Non-services related	Farm	287	169	456	20,925	
	Forestry, fishing, and agricultural services	—	—	—	4,299	
	Mining (including fossil fuels)	—	19*	19*	11,542	
	Construction	122	260	382	144,764	
	Manufacturing	70	151	221	145,477	
	Total non-services related	479*	599*	—	327,007	
Services related	Utilities	32	—	32*	4,919	
	Wholesale trade	20	54*	74*	59,796	
	Retail trade	252	532	784	211,052	
	Transportation and warehousing	60	135*	195*	86,115	
	Information	—	37	37*	43,646	
	Finance and insurance	46	105	151	138,597	
	Real estate and rental and leasing	134	375	509	114,435	
	Professional and technical services	85	232*	317*	169,367	
	Management of companies	0	27*	27*	31,623	
	Administrative and waste services	49	198	247	114,885	
	Educational services	45*	10	55*	71,356	
	Health care and social assistance	239*	212	451*	178,534	
	Arts, entertainment, and recreation	82*	164	246*	40,024	
	Accommodation and food services	884*	1,090	1,974*	121,770	
	Other services, except public administration	105*	725	830*	101,384	
	Total services related		2,033*	3,896*	5,929*	1,487,503
	Government	Total government	543	757	1,300	265,196

Source: U.S. Department of Commerce 2021

Note: All employment data are reported by place of work. Columns may not add up to reported totals due to rounding.

* = Estimates for data that were not disclosed

— = Data not available

Local residents are interested not only in which sectors create the jobs but also in the relative pay in those sectors. **Table 3-102** shows relative pay by sector.

Table 3-102. 2020 Wages by Industry (\$2021)

Type of Industry	Industry	Kane County (\$)	Garfield County (\$)	Utah (\$)
Non-services related	Natural resources and mining	54,095	37,258	68,817
	Agriculture, forestry, fishing, and hunting	—	—	39,508
	Mining (including fossil fuels)	—	—	89,111
	Construction	37,142	44,270	60,166
	Manufacturing (including forest products)	38,176	35,928	64,701
	All non-services related	40,908	39,378	62,957
	Services related	Trade, transportation, and utilities	30,734	28,924
Information		77,887	—	101,452
Financial activities		40,705	42,343	83,520
Professional and business services		48,312	45,694	71,513
Education and health services		34,712	46,248	50,101
Leisure and hospitality		30,593	23,365	22,588
Other services		48,247	—	41,348
Unclassified		—	—	86,809
All services related		36,345	37,684	56,364
Government		Federal government	69,345	59,584
	State government	52,513	41,226	61,526
	Local government	41,280	37,759	45,570
	All government	45,157	44,406	55,537

Source: U.S. Department of Labor 2021

— = Data not available

BLM-managed lands and federal mineral estate managed within the socioeconomic analysis area affect government budgets at local (county, city, town, school district, and special district), state, and federal levels based on revenues from sales taxes, property taxes, payments in lieu of taxes, mineral royalties, severance taxes, fees, and other funding sources. Likewise, lands and federal mineral estate in the socioeconomic analysis area result in government expenditures for management, law enforcement, and other activities.

The federal government's Office of Natural Resources Revenue collects royalties and rents from leases of federal lands for the production of coal, oil, gas, and other minerals. Federal mineral lease payments to the state are a function of royalties received from production on federal lands, as well as lease payments for parcels leased but not in production.

The federal government returns 49 percent of the total collected revenues to the state where the mineral production occurred. In fiscal year 2021, payments to Utah totaled \$55,144,537 (Office of Natural Resources Reven 2022).

The BLM field offices collect fees and other revenue for a variety of other uses of BLM-managed lands. These revenue sources include ROW rents, recreation fees, grazing fees, various permit fees, and more.

Revenues from the sales of land, vegetation, and mineral materials, along with ROW rents, mostly go to the U.S. Treasury, whereas the BLM field offices generally retain recreation fees. Grazing permit fees generate revenue for the U.S. Treasury. Of this, 12.5 percent is returned to the local grazing board in the state where the grazing lands are located. Per Section 10 of the Taylor Grazing Act, this money is then disbursed to local ranchers through the local grazing board, using a 40/60 matching-funds formula, for use in range improvements and maintenance projects. All the above payments totaled \$103,769 to Kane and Garfield Counties in fiscal year 2019 (primarily fees under the Taylor Grazing Act; BLM 2021).

In addition to the BLM payments, Utah counties receive money from the U.S. Department of the Interior. The U.S. Department of the Interior, which compensates county governments for nontaxable federal lands within their borders via payments in lieu of taxes. Payments in lieu of taxes are based on a maximum per-acre payment reduced by the sum of all revenue-sharing payments. These payments are subject to a population cap. Payments in lieu of taxes to Kane and Garfield Counties in fiscal year 2022 totaled \$1,063,643 and \$988,493, respectively (U.S. Department of the Interior 2022).

In Kane and Garfield Counties, local revenues from recreation and tourism, natural resources, and land ownership comprise an important portion of total local government revenues. **Table 3-103** summarizes the tourism- and minerals-related local government revenues obtained from these sources.

Table 3-103. Local Government Revenues from Tourism- and Minerals-Related Sources (2020)

Revenue Source	Kane County (\$)	Garfield County (\$)
Tourism-Related Revenues¹		
Tourism-related tax revenue (primarily sales and property taxes)	20,900,000	9,500,000
County transient room tax	3,783,371	1,749,876
Municipal transient room tax	227,218	322,447
Resort communities' sales tax	1,188,764	1,012,027
Restaurant tax	292,481	193,845
<i>Total tourism-related revenues</i>	<i>26,391,834</i>	<i>12,778,195</i>
Minerals-Related Revenues		
Natural resources property taxes (minerals-related property)	159,963	149,071
<i>Total natural resources-related revenues²</i>	<i>159,963</i>	<i>149,071</i>

Sources: Kem C. Gardner Policy Institute 2022; Utah State Tax Commission 2021

¹ Many of these were down significantly from 2019 due to COVID-19 pandemic-related travel decreases.

² Utah mineral severance tax revenues and oil and gas conservation fee revenues distributed to local governments are not included. These revenues would be difficult to quantify because most of these revenues are placed in the state's General Fund (some are set aside to benefit Tribal Nations). There is no direct correspondence between a particular county's natural resource production and the amount (if any) of severance tax revenues flowing back to the county or other local governments in the county.

It is important to note that the sectoral estimates in the tables above are not specific to BLM-managed resources or even to public lands generally. Tourism-related revenues are based on all tourism, which includes some activities on private property, on state lands, and on other federal lands, including local national parks and monuments. However, much of the tourism in both counties is based on the large public lands base that is unique to the area. The natural resources-related revenues include revenues from private property and public resources. Again, public lands and minerals are the basis for much of the activity in these industries in the counties.

Kane and Garfield Counties are rich in outdoor recreational resources enjoyed by local residents and many nonresidents. Visitation for outdoor recreation—whether passive pursuits like scenic drives or high-energy active sports like rock climbing and OHV riding—supports an active tourism industry. This industry is an important economic base for the socioeconomic analysis area. See **Section 3.17**, Recreation, for more details.

Livestock grazing is prevalent throughout GSENM. Forage is valuable to many of the ranchers in the socioeconomic analysis area. Grazing on this forage puts weight on calves and sustains producing heifers. Forage on BLM-managed lands may be the only forage available to some ranchers during parts of the year. In addition to its economic benefits for local ranchers and the local economy, grazing on BLM-managed lands has important social and cultural significance, such as way-of-life values for sustaining rural lifestyles and passing on traditions to their children and grandchildren. Some ranching families have been using these lands for generations. These lands help support a ranching culture that is a key part of the social fabric among analysis area communities. See **Section 3.16**, Livestock Grazing, for more details.

The current economic contribution from BLM-managed resources, such as grazing and recreation, and the projected impact on these resources is part of the discussion on environmental consequences in the following section.

Trends

Table 3-104 shows the basic demographic makeup in the socioeconomic analysis area for Garfield and Kane Counties and for Utah. From 2000 to 2020, at 6.4 percent and 29.9 percent, respectively, population growth in Garfield and Kane Counties was lower than in Utah, which experienced 44.8 percent growth during the same period. With a median age of 42.0 years in 2020, both Garfield and Kane Counties had an older population than Utah as a whole (30.3 years median age). Garfield County and the state showed an increasing median age over time, which is a national trend. However, Kane County saw a slight decrease in median age, from 45.3 to 42.0. Most of the counties' population growth has been internal, through births exceeding deaths, rather than from migration from outside the region.

Table 3-104. Demographic Trends (2000–2020)

	Garfield County	Kane County	Kane and Garfield Two-County Region	Utah
Population (2020)	5,050	7,914	12,964	3,249,879
Population percentage change (2000–2020)	6.4%	29.9%	19.6%	44.8%
Median age (2020)	42.0	42.0	N/A	30.3
Median age (2010)	39.8	45.3	N/A	28.8
Average annual population change, 2000–2020 from natural change	20	19	19	34,119
Average annual population change, 2000–2020 from net migration	-35	48	6	12,928

Source: U.S. Department of Commerce 2021

Table 3-105 shows changes in employment by industry from 2001 to 2020. Service-related jobs have grown the most over the last two decades, with accommodation and food services leading the way. Non-service industries in the same period have shown little growth, and they have shown actual decline in some sectors. For the socioeconomic analysis area, the growth in some sectors, especially accommodations and food services, may be due to the area's increasing popularity for recreation and tourism.

Table 3-105. Jobs by Industry Trends (2001–2020)

Type of Industry	Industry	Garfield County	Kane County	Kane and Garfield Two-County Region	Utah
Total	Total change in jobs	348	1,499	1,847	687,949
Non-services related	Farm	0	12	12	369
	Forestry, fishing, and agricultural services	—	—	—	1,724
	Mining (including fossil fuels)	—	3*	3*	2,670
	Construction	-1	62*	61*	49,679
	Manufacturing	-22	3	-19*	18,453
	Total non-services related	-23*	80*	57*	72,895
	Services related	Utilities	1	-	1*
Wholesale trade		-4*	21*	17*	13,809
Retail trade		29	112	141	51,491
Transportation and warehousing		32*	90*	122*	37,889
Information		—	12*	12*	6,697
Finance and insurance		43*	41	84*	57,596
Real estate and rental and leasing		93*	228	321*	58,951
Professional and technical services		44	213*	257*	89,831
Management of companies		0	1*	1*	9,314
Administrative and waste services		31*	134	165*	36,389
Educational services		43*	-2	41*	40,315
Health care and social assistance		67*	133	200*	78,320
Arts, entertainment, and recreation		41*	-180	-139*	12,296
Accommodation and food services		53*	452	505*	34,526
Other services, except public administration		10*	324	334*	28,907
Total services related		483*	1,579*	2,062*	556,921
Government	Total government	-50	11	-39	58,133

Source: U.S. Department of Commerce 2021

Note: All employment data are reported by place of work. Columns may not add up to reported totals due to rounding.

* = Estimates for data that were not disclosed

— = Data not available

Forecasts

The population is expected to increase in Garfield and Kane Counties between 2015 and 2065 (by 45 percent and 57 percent, respectively; see **Table 3-106**). This population increase could contribute to issues in the counties, if it puts added strain on public services, increases conflict in the communities, contributes to housing shortages, or changes the way-of-life for residents. On the other hand, the population increase could result in benefits to the counties, if there are increased economic contributions from more recreation and more employment.

Table 3-106. Population Forecasts (2015–2065)

Geography	2015	2025	2035	2045	2055	2065	Percent Change (2015–2065)
Garfield County	5,164	5,845	6,405	6,697	7,083	7,509	45
Kane County	7,271	8,684	9,611	10,179	10,736	11,446	57
Utah	2,997,404	3,615,036	4,178,317	4,745,057	5,285,767	5,827,810	94

Source: Perlich et al. 2017

The forecasted employment for Garfield County, Kane County, and Utah is expected to increase from 2015 to 2065 by a similar percentage as projected population. This suggests that the increased number of jobs will be met by an increase in people, so the number of people unemployed in the counties will not change materially over the next 40 to 50 years (**Table 3-107**); however, economic contributions could increase due to the increase in overall employment.

Table 3-107. Total Employment Forecasts (2015–2065)

Geography	2015	2025	2035	2045	2055	2065	Percent Change (2015–2065)
Garfield County	3,420	4,063	4,461	4,814	5,144	5,453	59
Kane County	4,799	5,554	6,106	6,591	7,016	7,375	54
Utah	1,863,692	2,373,675	2,728,541	3,056,754	3,368,205	3,658,710	96

Source: Perlich et al. 2017

Table 3-108 shows the projected employment by industry for Utah. The industries with the biggest forecasted percentage growth are construction, professional and technical services, and administrative and waste services. Compared with the historical trends in employment by industry (**Table 3-105**), the industries that saw the largest historical growth for Garfield and Kane Counties (real estate, health care, and accommodation and food services) also are expected to increase in employment over the next 40 years.

Table 3-108. Total Utah Employment by Industry Forecasts (2015–2065)

Industry	2015	2025	2035	2045	2055	2065	Percentage Change (2015–2065)
Agriculture	5,375	6,139	6,680	7,261	7,878	8,527	58.7
Mining	10,371	14,594	14,842	13,603	11,955	10,810	4.2
Utilities	3,915	3,396	2,853	2,746	2,729	2,707	-30.8
Construction	84,679	139,236	189,393	245,869	313,012	394,184	365.5
Manufacturing	123,742	138,616	144,029	148,167	152,890	156,397	26.4

Industry	2015	2025	2035	2045	2055	2065	Percentage Change (2015–2065)
Retail	157,969	179,273	189,685	201,068	211,428	220,018	39.3
Transportation and warehousing	51,122	65,317	64,180	60,221	53,381	44,673	-12.6
Wholesale	50,004	61,934	66,637	69,321	71,380	73,100	46.2
Information	34,443	43,727	52,475	63,234	74,976	85,930	149.5
Finance and insurance	60,386	74,663	84,591	95,522	105,455	113,366	87.7
Real estate	18,643	21,591	24,105	26,032	27,040	26,307	41.1
Professional and technical services	88,018	137,359	181,517	222,857	260,580	292,024	231.8
Management	20,203	19,539	17,860	16,383	14,673	12,541	-37.9
Administrative and waste services	85,999	130,583	162,265	191,742	220,526	248,263	188.7
Education	42,128	61,471	70,392	75,231	80,101	86,199	104.6
Health	140,163	190,858	232,200	261,278	280,145	289,890	106.8
Arts, entertainment, and recreation	21,111	30,207	36,676	43,465	50,219	55,756	164.1
Accommodations and food	112,549	137,441	143,292	147,809	151,409	154,388	37.2
Other services	38,697	37,176	40,101	41,403	39,984	35,587	-8.0
State and local government	198,676	233,844	264,700	296,485	328,071	358,892	80.6
Federal government, civilian	34,958	40,581	43,789	46,583	49,215	51,831	48.3
Federal government, military	16,166	15,296	15,277	15,320	15,350	15,356	-5.0
All other employment	464,381	590,834	681,001	765,152	845,806	921,964	98.5
State total	1,863,692	2,373,675	2,728,541	3,056,754	3,368,205	3,658,710	96.3

Source: Perlich et al. 2017

3.21.2 Environmental Consequences

Refer to **Section F.32**, Social and Economic Values, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issues

- How would BLM management actions impact local and regional economic interests and conditions?
- How would BLM management actions impact social conditions and values of communities?

Analytical Methods and Assumptions

Local and Regional Economic Interests and Conditions

The economic values from resource management decisions were calculated using the Impact Analysis for Planning Model (IMPLAN), an input-output model that tracks inter-industry and consumer spending in a

local or regional economy; this allows estimation of indirect and induced economic impacts from a one-time direct change to the economy due to increases or decreases in expenditures, employment, or income. Indirect impacts result from the inter-industry transactions (for example, when a recreation outfitter buys supplies from a local grocery store). Induced impacts result from re-spending of household income (for example, when employees of the recreation outfitter buy goods for personal use at a local grocery store). The outputs calculated from IMPLAN include gross regional economic output, value added, employment, and labor income.

Recreation and livestock grazing and ranching are some of the most important industries within the planning area, so the economic contributions analysis focused on impacts from the BLM’s management decisions on these resource uses. The modeled direct impacts were calculated from estimated recreation expenditures per visitor party and economic value from grazing per billed AUM. These impacts were then multiplied by the projected number of visitor parties and projected billed AUMs to calculate the total direct impacts from the BLM’s management in GSENM.

Recreation expenditures are calculated based on the number of visitors to GSENM for each type of visit, the number of people in the party, and the amount of spending per party for each visit type and type of expense (White 2017, 2022). **Table 3-109** shows the estimated number of annual visitors in GSENM by type for Alternative A. The total number of visitors under Alternatives A was estimated by multiplying the number of visitors in 2021 by the average annual growth rate in visitors from 2010 to 2021 (7.7 percent). Economic impacts from changes in recreation under Alternatives B, C, and D are discussed qualitatively with respect to differences from Alternative A.

Nonlocal visitors are those who travel 50 miles or more from home to the destination, and local visitors are those who travel less than 50 miles to the destination. Visitors who stay overnight in GSENM might camp in a designated campsite or disperse camp, whereas visitors who stay overnight off GSENM might stay at a hotel in a community nearby. Non-primary visitors are people who visited GSENM, but GSENM was not their primary purpose for being in the area.

Table 3-109. Estimated Number of Visitors by Visit Type in GSENM under Alternative A

Visit Type	Number of Visitors
Nonlocal day trip	9,309
Nonlocal overnight staying in GSENM	232,736
Nonlocal overnight staying off GSENM	688,899
Local day trip	14,396
Local overnight staying in GSENM	7,198
Local overnight staying off GSENM	7,198
Not primary	516,781
Total	1,476,518

Source: BLM 2022

Notes: The totals in the table may not exactly equal the sum of the line items above due to rounding.

Table 3-110 shows the spending patterns per party based on the visit type and type of expenditures.³⁰ A party of nonlocal visitors staying overnight off GSENM tends to spend more on expenses such as hotels, restaurants, entry fees, recreation and entertainment, souvenirs, and other expenses than a party of nonlocal visitors staying in GSENM. Local visitor parties tend to spend less overall than nonlocal visitor parties.

Table 3-110. Spending Profile per Party by Visit Type (2022\$)

Type of Expenditure	Nonlocal Day Trip	Nonlocal Overnight Staying in GSENM	Nonlocal Overnight Staying off GSENM	Local Day Trip	Local Overnight Staying in GSENM	Local Overnight Staying off GSENM	Not Primary
Hotel/motel/bed and breakfast	0.00	0.00	294.39	0.00	0.00	90.92	203.76
Camping	0.00	36.54	22.23	0.00	26.39	18.73	16.65
Restaurant	21.93	35.78	159.33	7.98	13.15	58.36	140.28
Groceries	11.61	63.62	83.41	7.04	77.44	60.80	61.04
Gas and oil	30.08	68.22	88.18	13.99	47.26	60.14	61.59
Other transportation	0.55	4.77	6.10	0.13	4.75	6.29	5.66
Entry fees	4.37	6.82	16.44	2.95	6.44	7.53	11.50
Recreation and entertainment	3.95	9.35	27.66	1.43	2.58	9.14	25.86
Sporting goods	3.49	12.82	13.78	3.61	11.62	12.08	9.14
Souvenirs and other expenses	2.91	9.74	27.67	0.78	2.33	7.48	27.84

Source: White 2017, 2022

The economic value of livestock grazing was calculated based on the average value of cattle production per AUM, over 10 years (White 2017, 2022). **Table 3-111** shows the value of production per cow, AUMs per cow, and adjusted value of production per AUM. The 10-year average value of production per AUM (in 2021\$) was approximately \$52.69. **Table 3-112** shows the number of currently permitted AUMs (106,202), billed AUMs (76,957), and the calculated percentage of billed AUMs to permitted AUMs (72 percent), as well as the available AUMs and estimated projected billed AUMs for each alternative. The estimated projected number of billed AUMs was calculated by multiplying the percentage of current billed AUMs to permitted AUMs (72 percent) by the available AUMs for each alternative.

Table 3-111. Value of Production for Grazing

Year	Value of Production per Cow (Nominal \$)	AUMs per Cow	Adjusted Value of Production per AUM (2021\$)
2012	744.93	16	52.39
2013	780.50	16	56.46
2014	1,076.00	16	93.34
2015	1,015.79	16	81.00
2016	704.62	16	46.84
2017	710.20	16	48.46

³⁰On average, a party size is about 2.44 visitors (White 2017, 2022).

Year	Value of Production per Cow (Nominal \$)	AUMs per Cow	Adjusted Value of Production per AUM (2021\$)
2018	589.29	16	38.75
2019	558.00	16	36.69
2020	565.77	16	35.06
2021	606.07	16	37.88
10 Year Average	735.12	16	52.69

Source: U.S. Department of Agriculture, Economic Research Service 2022; White 2017, 2022; IMPLAN 2022

Table 3-112. Number of Permitted, Billed, Available, and Projected Billed AUMs

Alternative	Permitted AUMs	Billed AUMs	Percentage of Billed AUMs to Permitted AUMs	Available AUMs	Estimated Projected Billed AUMs ¹
Current	106,202	76,957	72%	107,995	—
Alternative A ²	—	—	—	107,995	78,256
Alternative B	—	—	—	105,034	76,111
Alternative C	—	—	—	95,406	69,134
Alternative D	—	—	—	45,248	32,788

— = Not available

¹ Calculated based on the available AUMs for each alternative multiplied by the current percentage of billed AUMs to permitted AUMs. Voluntary relinquishments of grazing permits would decrease this amount across all alternatives.

²To account for the additional AUMs the BLM has been instructed to permit, as part of the 2020 KEPA RMP, Alternative A assumes that there will be additional projected billed AUMs (BLM 2020). The total estimated projected billed AUMs under Alternative A are calculated using the same approach as the estimated projected billed AUMs under Alternatives B, C, and D (by multiplying the percentage of current billed AUMs to permitted AUMs and the total available AUMs).

Social Conditions and Community Values

There are many other values not captured from economic contributions, such as values from access to products, education, public health and safety, visitor or viewer enjoyment, way of life or culture, social cohesion, and ecosystem values. These values are often called nonmarket values, which are the benefits that individuals attribute to experiences of the environment or uses of natural and cultural resources that do not involve market transactions and, therefore, lack prices. There are many types of nonmarket values. Three nonmarket values are considered in the analysis: 1) the benefits to local communities from the amenity values provided by open space and scenic landscapes; 2) the benefits to individuals, such as the value to recreationists and visitors above and beyond the cost that they pay to recreate; and 3) ecosystem service values, which refer to the ways that healthy ecosystems support, enable, or protect human activity.

In examining nonmarket values, economists often distinguish between “use values” and “nonuse values.” A use value refers to the benefits an individual derives from some direct experience or activity, such as climbing a spectacular peak, hunting, or viewing wildlife. In contrast, a nonuse value refers to the utility or psychological benefit some people derive from the existence of some environmental condition that may never be directly experienced, such as an unspoiled landscape or the continued presence of an endangered species. Estimating nonuse values for specific resources is difficult and often controversial. The BLM guidance recommends that use values be emphasized rather than nonuse values (BLM 2013).

Nonmarket values are important to consider because they help tell the entire socioeconomic story. Estimates of nonmarket values supplement estimates of income generated from commodity uses to

provide a more complete picture of the economic implications of proposed resource management decisions. It is difficult to put a dollar number on those values, but the correct answer is not “zero,” so it is important to consider these values. In the following analysis, nonmarket values are discussed qualitatively, and when information is available, examples of these values in analogous situations are provided.

Proximity to open spaces can affect property values. This analysis will use literature to examine the economic benefits to local economies from this proximity to open spaces. Economic benefits to individuals will be measured using consumer surplus values to calculate the value of GSENM to recreationists and visitors. Consumer surplus is defined as the maximum dollar amount, above any actual payments made, that a consumer would be willing to pay to enjoy a good or service. For instance, hikers pay a market price for gasoline used to reach a trail but pay nothing to use the trail. Any amount that a recreationist would be willing to pay to use this otherwise free resource represents the nonmarket consumer surplus value of that resource to that consumer.

A 2016 report summarized the findings of consumer surplus values per person per day by recreational activity from 421 studies (totaling 3,192 different value estimates) covering the United States and Canada from 1958 to 2015 (Rosenberger 2016). These values, or a range of values from specific individual studies that are most comparable to the decision area, will be applied to recreational usage figures (for example, visitor days) to estimate the recreation-related nonmarket use value—the consumer surplus—for the decision area. Economic benefits from ecosystem services will be examined by providing an inventory of the ecosystem benefits from GSENM, including any applicable benefits from potable water from groundwater recharge, flood control from intact wetlands, and carbon sequestration from healthy forests and certain agricultural lands.

Impacts Common to All Alternatives

Local and Regional Economic Interests and Conditions

Under all alternatives, GSENM would provide value to the local and regional economy by providing recreational opportunities and grazing and ranching allotments. This value is realized through local jobs, wages, and economic output. As the population in the analysis area is expected to continue to increase in the future, the local jobs, labor income, and economic output that are provided in GSENM are increasingly important to the communities.

Social Conditions and Community Values

Under all alternatives, the open space provides many benefits to the surrounding communities, such as increasing quality of life through visual resources, access to products and resources, fresh water, and air quality; waste regulation; biodiversity maintenance; soil formation; protection from natural hazards; and opportunities for solitude and spiritual connection to the landscape. Although the value of these benefits cannot be quantified through market mechanisms, estimates of some of the value can be obtained through measures like property values and recreation consumer surplus.

Many studies have found a positive relationship between proximity to a park or open space and a premium on property sale price. The premium could be as high as 8 to 10 percent on property sale prices that are adjacent to parks or open spaces. Furthermore, there tends to be a higher value placed on properties near open spaces that are protected from development than properties near open spaces that could be developed in the future (Crompton and Nicholls 2020).

Under all alternatives, the BLM's management decisions provide nonmarket benefits to the community through recreation, such as enjoyment from recreating on open spaces and viewing landscapes, improved mental and physical health and reduced potential health costs through increased exercise and environmental and air quality, social cohesion, and increased way-of-life benefits through providing opportunities for intergenerational land uses and practices. These nonmarket benefits are difficult to quantify because they are above and beyond the values captured through what visitors pay to recreate (that is, lodging expenses, entrance fees, equipment rentals or purchases, etc.). **Table 3-113** shows estimated average consumer surplus values for recreational use (which are the values above what recreators pay; they capture what recreators would be willing to pay) by primary activity in the Forest Service Intermountain Region, which is the closest Forest Service region to GSENM and the conclusions of which can be applied to GSENM. The activities with the highest consumer surplus are nonmotorized boating, biking, and hiking. Under all alternatives, these recreational benefits, to the extent they occur in the analysis area, would continue to provide value to the local and nonlocal visitors. See **Section 3.17, Recreation**, for more information.

Recreation values are sometimes in opposition to other nonmarket values, and recreation could lead to potentially negative impacts on the surrounding communities. These impacts could include adverse impacts on nonmarket values to open spaces (through crowding and congestion), reduced quality-of-life (through increased traffic or conflicts with livestock grazing), and increased risk of destruction or disturbance to traditional values and cultural resources. Under all alternatives, these impacts could continue affect the communities in the analysis area.

Table 3-113. Estimates of the Average Consumer Surplus of Recreational Benefits for the Intermountain Region, per Person per Primary Activity Day

Primary Activity	Average Consumer Surplus (\$)
Backpacking	42.81
Biking	96.40
Cross-country skiing	66.18
Developed camping	45.27
Downhill skiing	91.88
Fishing	81.18
Hiking	94.12
Hunting	87.07
Motorized boating	68.03
Nature related	69.79
Nonmotorized boating	118.59
OHV use/snowmobiling	60.11
Other recreation	74.66
Picnicking	58.83
Weighted average	77.04

Source: Rosenberger et al. 2017

Grazing and ranching are an important resource to communities by providing a sense of place, sustaining rural lifestyles, passing on traditions and practices to future generations, and increasing the quality of life of those ranching and farming community members. Many farmers and ranchers dedicate their entire working lives to the practice. The resources that GSENM provides, under all alternatives, often support

the livelihoods of these community members and their families. See **Section 3.16**, Livestock Grazing, for more information.

The BLM’s management decisions regarding fire and fuels management aim to provide for resilient and resistant landscapes, protecting fire-adapted communities by reducing the fire hazard, especially within wildland-urban interface areas, and improving safe and effective wildfire response. Under all alternatives, the BLM will continue to provide these nonmarket benefits that will support safety and increase visual scenery, which can increase quality of life throughout the community. See **Section 3.13**, Fire and Fuels Management, for more information.

Ecosystem services are commonly subdivided into four categories, according to the type of benefit provided (World Resources Institute 2005): provisioning services, regulating services, cultural or information services, and supporting services. Provisioning services are products directly obtained from ecosystem services for basic human needs, such as food, water, minerals, shelter, and fuel. Regulating services maintain water and air quality; these services include flood regulation and carbon sequestration. Supporting services maintain habitats for wildlife and include nutrient cycling and biodiversity. Cultural and information services relate to aesthetic values, recreational opportunities, and spiritual uses.

Ecosystem goods and services in the analysis area are associated with three main resources (rangelands, recreation, and water), as identified in **Table 3-114**. Although the listed resources and their associated human benefits represent key areas of importance for GSENM management, this list is not inclusive of all goods and services provided in GSENM. See **Section 3.4**, Water Resources, **Section 3.16**, Livestock Grazing, and **Section 3.17**, Recreation, for more details.

Table 3-114. Ecosystem Goods and Services in the Analysis Area, by Benefit

Provisioning	Supporting/Regulating Rangeland	Cultural/Information
<ul style="list-style-type: none"> • Domestic livestock production • Other food for human consumption • Forage for livestock • Water for downstream economic uses 	<ul style="list-style-type: none"> • Clean drinking water • Wildlife habitat benefits (hunting, viewing, existence value, etc.) • Floods for channel and riparian area rejuvenation • Flood mitigation • Minimization of soil erosion and downwind/downstream soil deposition • Contribution to clean, fresh air • Carbon sequestration 	<ul style="list-style-type: none"> • Scenic views • Support for traditional agrarian lifestyle • Historic and archaeological sites • Recreation and tourism sites
Water Resources		
<ul style="list-style-type: none"> • Irrigation water • Domestic water • Water for livestock 	<ul style="list-style-type: none"> • Floods for channel and riparian area rejuvenation • Groundwater recharge 	<ul style="list-style-type: none"> • Support for traditional lifestyle

Provisioning	Supporting/Regulating Recreation	Cultural/Information
<ul style="list-style-type: none"> • Access to hunting for food for human consumption 	<ul style="list-style-type: none"> • Promotion of public lands stewardship 	<ul style="list-style-type: none"> • Support for mental and physical health • Scenic resources • Opportunities for family/multigenerational connection

Alternative A

Local and Regional Economic Interests and Conditions

From 2010 to 2021, visitor numbers at GSENM increased from 742,586 to 1,371,036, which is approximately 7.7 percent per year, on average (BLM 2022a). Visitors to GSENM are expected to increase as area population increases, outdoor recreation becomes more popular, and GSENM becomes more well known. Under Alternative A, there would be no change to acres available or closed to recreation, but the trend in number of visitor is expected to continue. The projected number of visitor parties is estimated to be approximately 1,476,518 visitors (calculated from the visitor number in 2021 multiplied by the 7.7 annual growth rate), which would be 605,905 parties. Under Alternative A, this could result in the continued economic contributions of approximately 3,700 employees, \$123 million in labor income, and \$386 million in economic output (see **Table 3-115**).

Table 3-115. Economic Contributions for Recreation under Alternative A (2023\$)

Impact	Employment		Labor Income (\$000)		Value Added (\$000)		Output (\$000)	
	Per 1,000 Parties ¹	Total	Per 1,000 Parties ¹	Total	Per 1,000 Parties ¹	Total	Per 1,000 Parties ¹	Total
Direct	4.99	3,026	165	100,058	264	159,904	458	277,364
Indirect	0.70	423	23	14,147	44	26,399	115	69,601
Induced	0.42	252	14	8,323	34	20,727	64	39,034
Total ²	6.11	3,700	202	122,528	342	207,029	637	386,000

Source: IMPLAN 2023

¹Economic contribution results from IMPLAN modeling are linear, so a 10 percent change in recreation party estimates, for example, would equal a 10 percent change in economic contributions. Changes in recreation party estimates could also be multiplied by the per 1,000 party multipliers to get the total contributions from the new recreation party number.

²Totals may not exactly equal the sum of the impacts above due to rounding.

Under Alternative A, there would be no change to the number of available allotments. However, as noted above, under Alternative A, the BLM would have the potential to permit the additional available allotments. If approximately 72 percent of these permitted AUMs are used and billed (which is the current percentage of billed AUMs to permitted AUMs), there could be an increase in estimated billed AUMs of almost 1,300 billed AUMs from current billed AUMs (see **Table 3-112**). Under Alternative A, the economic contribution from approximately 78,256 estimated billed AUMs could result in approximately 51 total jobs, \$2 million in labor income, \$2.5 million in value added, and \$6.8 million in economic output (see **Table 3-116**).

Table 3-116. Economic Contributions for Grazing under Alternative A (2023\$)

Impact	Employment		Labor Income (\$)		Value Added (\$)		Output (\$)	
	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total
Direct	0.42	33	17,235	1,348,768	19,141	1,497,898	53,595	4,194,107
Indirect	0.17	13	5,871	459,456	7,808	611,063	23,305	1,823,789
Induced	0.06	5	2,024	158,418	5,091	398,419	9,548	747,218
Total ²	0.66	51	25,131	1,966,642	32,041	2,507,380	86,448	6,765,114

Source: IMPLAN 2023

¹Economic contribution results from IMPLAN modeling are linear, so a 10 percent change in recreation party estimates, for example, would equal a 10 percent change in economic contributions. Changes in recreation party estimates could also be multiplied by the per 1,000 party multipliers to get the total contributions from the new recreation party number.

²Totals may not exactly equal the sum of the impacts above due to rounding.

The economic contributions from tax revenue-generating activities like recreation and tourism would likely continue to help support public services in the region, such as education and transportation.

It should be noted that the total economic contributions does not encompass the complete value of grazing to the local economy. There are nonmarket values associated with grazing, such as way-of-life values, that are not reflected in these numbers, as discussed in the section below.

Social Conditions and Community Values

Under Alternative A, the nonmarket benefits and ecosystem services provided by the BLM’s management decisions in the analysis area would continue. Under Alternative A, there would continue to the same number of acres managed as limited OHV travel, so there would continue to be access to products and resources.

There would continue to be no acres managed to protect or minimize lands with wilderness characteristics under Alternative A. This means there would likely continue to be impacts on the benefits and values associated with protected open space. There could be reductions in values associated with conservation of ecosystems for future generations, and the benefits associated with the ecosystem services provided on protected open space—some of which are listed in **Table 3-114**—would likely not be as big, due to the lack of protection for lands with wilderness characteristics. Additionally, there could be reductions in values associated with way of life and quality of life, visual and sound resources, environmental and air quality, and preservation of cultural and historical knowledge.

On the other hand, the benefits associated with recreation, such as impacts on mental and physical health and visitor and viewer enjoyment from recreation, would continue under Alternative A, due to continued availability of areas for recreational uses. This increase in recreational value could lead to reduced social cohesion, if there are increase in conflicts among different user groups, such as recreationists and local ranchers.

Alternative B

Local and Regional Economic Interests and Conditions

Under Alternative B, the acreage managed as SRMAs, ERMAs, and RMZs would be very similar to under Alternative A, so the estimated number of visitors and segment of visitors would likely be the same as

under Alternative A. This would likely lead to the same impacts on the economy and contributions from the BLM’s management decisions for recreation as under Alternative A.³¹

The grazing allotments that would be eliminated under Alternative B are not currently being held, so there would likely be no economic impact under Alternative B, compared with current permits and current AUMs. However, there could be economic impacts if the allotments that are not currently being held are expected to be permitted, as was requested of the BLM in the 2020 KEPA RMP (BLM 2020) and as discussed in the impacts under Alternative A. Under Alternative B, the number of estimated projected billed AUMs would likely decrease by over 2,000, compared with the estimated projected billed AUMs under Alternative A, which includes billed AUMs from the potential permits that are not currently being held (**Table 3-112**). Under Alternative B, the economic output for grazing could be approximately \$6.6 million, which would be approximately \$185,000 less in output than under Alternative A. Under Alternative B, the number of employees and labor income attributed to the BLM’s management decisions about grazing could be approximately 50 employees and \$1.9 million, respectively, which is approximately 1 job fewer and \$54,000 less than under Alternative A (see **Table 3-117**).

Table 3-117. Economic Contributions for Grazing under Alternative B (2023\$)

Impact	Employment		Labor Income (\$)		Value Added (\$)		Output (\$)	
	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total
Direct	0.42	32	17,235	1,311,788	19,141	1,456,829	53,595	4,079,113
Indirect	0.17	13	5,871	446,859	7,808	594,309	23,305	1,773,785
Induced	0.06	5	2,024	154,075	5,091	387,495	9,548	726,731
Total ²	0.66	50	25,131	1,912,721	32,041	2,438,633	86,448	6,579,628

Source: IMPLAN 2023

¹Economic contribution results from IMPLAN modeling are linear, so a 10 percent change in recreation party estimates, for example, would equal a 10 percent change in economic contributions. Changes in recreation party estimates could also be multiplied by the per 1,000 party multipliers to get the total contributions from the new recreation party number.

²Totals may not exactly equal the sum of the impacts above due to rounding.

Impacts on public services and infrastructure, due to economic contributions from tax revenue-generating activities, would likely be similar to Alternative A and would be minimal. Social Conditions and Community Values

Under Alternative B, there would be an increase in areas closed to OHV travel of over 950,000 acres, compared with Alternative A. This could limit access to products and resources, including cultural and subsistence resources.

Under Alternative B, the acres managed to protect lands with wilderness characteristics would increase by 72,000, compared with under Alternative A. This could increase the overall value of nonmarket benefits provided through protected open space, compared with Alternative A. These increased benefits include values associated with conservation of ecosystems for future generations, ecosystem services provided on protected open space, way of life and sustaining lifestyles near open spaces, environmental and air quality, preservation of cultural and historical knowledge, and visual and sound resources. The benefits from these values would likely be greater under Alternative B than under Alternative A.

³¹ Economic contribution results from IMPLAN modeling are linear, so if new estimates in number of visitors were calculated based on new information, economic contributions from these new estimates could be calculated based on the percent change in inputs (for example, a 10 percent change in recreation party estimates would equal a 10 percent change in economic impacts).

Under Alternative B, there would continue to be 487,600 acres of land managed for other discretionary uses, so, while there would likely continue to be nonmarket benefits associated with recreation, visitors would be directed to recreate in more populated areas, potentially leading to issues of crowding and impacts on social cohesion. This could reduce the nonmarket values associated with recreation compared with Alternative A, such as mental and physical health and visitor and viewer enjoyment from recreation.

Alternative C

Local and Regional Economic Interests and Conditions

Under Alternative C, the BLM would designate more SRMAs and fewer ERMAs than under Alternative A. These designations might lead to a change in the number of visitors, but it is likely to be minimal, so the estimated number of visitors and types of visits was estimated to be the same as under Alternative A.³² This would likely lead to the same impacts on the economy and contributions from the BLM’s management decisions for recreation as under Alternative A.

Under Alternative C, the estimated number of billed AUMs could be over 9,000 AUMs less than under Alternative A (see **Table 3-112**). This reduction in AUMs would likely result in a decrease in economic contributions from grazing under Alternative C, compared with Alternative A. Under Alternative C, the economic output for grazing could be approximately \$6 million, which would be approximately \$789,000 less in output than under Alternative A. Under Alternative C, the number of employees and labor income attributed to the BLM’s management decisions for grazing could be approximately 45 employees and \$1.7 million, respectively, which is approximately 6 jobs fewer and \$229,000 less in labor income than under Alternative A (see **Table 3-118**).

Impacts on public services and infrastructure, due to economic contributions from tax revenue-generating activities, would likely be minimal, similar to Alternative A.

Table 3-118. Economic Contributions for Grazing under Alternative C (2023\$)

Impact	Employment		Labor Income (\$)		Value Added (\$)		Output (\$)	
	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total
Direct	0.42	29	17,235	1,191,542	19,141	1,323,288	53,595	3,705,199
Indirect	0.17	12	5,871	405,897	7,808	539,831	23,305	1,611,190
Induced	0.06	4	2,024	139,952	5,091	351,975	9,548	660,115
Total ²	0.66	45	25,131	1,737,391	32,041	2,215,094	86,448	5,976,503

Source: IMPLAN 2023

¹Economic contribution results from IMPLAN modeling are linear, so a 10 percent change in recreation party estimates, for example, would equal a 10 percent change in economic contributions. Changes in recreation party estimates could also be multiplied by the per 1,000 party multipliers to get the total contributions from the new recreation party number.

²Totals may not exactly equal the sum of the impacts above due to rounding.

³² Economic contribution results from IMPLAN modeling are linear, so if new estimates in number of visitors were calculated based on new information, economic contributions from these new estimates could be calculated based on the percent change in inputs (for example, a 10 percent change in recreation party estimates would equal a 10 percent change in economic impacts).

Social Conditions and Community Values

Under Alternative C, there would be an increase in areas closed to OHV travel of 1,148,000 acres, compared with Alternative A, which is an increase of approximately 62 percent. This would likely limit access to production and resources, including cultural and subsistence resources.

Under Alternative C, the acres managed to protect lands with wilderness characteristics would increase by 190,100, and the acres managed to minimize impacts on lands with wilderness characteristics would increase by 366,900, compared with under Alternative A. Similar to under Alternative B, this change in protected lands could increase the value of nonmarket benefits provided through protected open space, compared with Alternative A. These increased benefits include values associated with conservation of ecosystems for future generations, ecosystem services provided on protected open space, way of life and sustaining lifestyles near open spaces, environmental and air quality, preservation of cultural and historical knowledge, and visual and sound resources. The benefits from these values would likely be greater under Alternative B than under Alternative A.

Under Alternative C, visitors would be directed to recreate in more populated areas, potentially leading to issues of crowding and impacts on social cohesion, similar to Alternative B. This could reduce the nonmarket values associated with recreation, including mental and physical health and visitor and viewer enjoyment from recreation, compared with Alternative A.

Alternative D

Local and Regional Economic Interests and Conditions

Under Alternative D, the areas managed as closed to OHV use would be larger than any other alternative, and land use allocations and discretionary uses including recreational activities would be the most limited compared with the other alternatives. The BLM management decisions under Alternative D could provide more opportunities to recreate in more remote areas, which could lead to an increase in visitors who are experienced in dispersed camping and recreating in the backcountry. On the other hand, the BLM's management decisions could lead to a decrease in access to areas and resources, which could lead to a reduction in visitors. The extent to which this change in number of recreation visitors would impact overall economic contributions would depend on the overall number of projected visitors to GSENM and the change in type of visitors.

Under Alternative D, there would be over 45,000 fewer estimated billed AUMs than under Alternative A (see **Table 3-112**), which could result in a decrease in economic contributions from grazing. Under Alternative D, the economic output for grazing could be approximately \$2.8 million, which would be approximately \$3.9 million less in output than under Alternative A. The number of employees and labor income attributed to the BLM's management decisions for grazing under Alternative D could be approximately 22 employees and \$824,000, respectively. This is approximately 30 fewer jobs and \$1.1 million less in labor income than under Alternative A (see **Table 3-119**).

Some permittees secure bank loans for their ranching operations, and the BLM permit is often used as part of their asset valuation for collateral. The value of the permit for the purposes of the loan is based on the number of permitted AUMs. For these permittees, a reduction in permitted AUMs due to eliminating the suspended AUMs under Alternative D could have an adverse financial impact. However, this financial impact would depend on proprietary and confidential information, including the finances of the operators and the conditions of the loan.

Table 3-119. Economic Contributions for Grazing under Alternative D (2023\$)

Impact	Employment		Labor Income (\$)		Value Added (\$)		Output (\$)	
	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total	Per 1000 AUMs ¹	Total
Direct	0.42	14	17,235	565,110	19,141	627,593	53,595	1,757,257
Indirect	0.17	6	5,871	192,504	7,808	256,025	23,305	764,136
Induced	0.06	2	2,024	66,375	5,091	166,931	9,548	313,071
Total ²	0.66	22	25,131	823,989	32,041	1,050,548	86,448	2,834,463

Source: IMPLAN 2023

¹Economic contribution results from IMPLAN modeling are linear, so a 10 percent change in recreation party estimates, for example, would equal a 10 percent change in economic contributions. Changes in recreation party estimates could also be multiplied by the per 1,000 party multipliers to get the total contributions from the new recreation party number.

²Totals may not exactly equal the sum of the impacts above due to rounding.

Impacts on public services and infrastructure, due to economic contributions from tax revenue-generating activities, would likely be minimal, similar to Alternative A.

Social Conditions and Community Values

Under Alternative D, the BLM would manage an additional 1,636,000 acres as closed to OHV travel than Alternative A, which is an increase of approximately 88 percent (the most acres closed to OHV travel of all alternatives). This would likely limit access to products and resources, including cultural and subsistence resources, more than under Alternative A.

Under Alternative D, the acres managed to protect lands with wilderness characteristics would increase by 559,600, compared with under Alternative A. The acres managed for other discretionary uses—while not protecting wilderness characteristics—would be reduced to zero under Alternative D. Under Alternative D, the BLM would place the most restrictions on other uses that would not contribute to the protection of wilderness characteristics. As such, the benefits associated with protected open spaces would likely be highest under Alternative D. These increased benefits include values associated with conservation of ecosystems for future generations, ecosystem services provided on protected open space, way of life and sustaining lifestyles near open spaces, environmental and air quality, preservation of cultural and historical knowledge, and visual and sound resources. The benefits from these values would likely be greater under Alternative D than under Alternative A.

On the other hand, the nonmarket values and ecosystem services associated with uses like recreation and grazing would likely be lowest under Alternative D. The reduced values could include impacts on social cohesion, mental and physical health, and visitor and viewer enjoyment from recreation.

Cumulative Impacts

Local and Regional Economic Interests and Conditions

Past, present, and reasonably foreseeable recreation and grazing projects and activities in the analysis area and the surrounding communities could contribute to cumulative impacts in the regional economy. The recreation projects that improve or add hiking and mountain biking trails, dispersed camping sites, and site facilities would increase the number of visitors to the area. This, in turn, would increase the visitors to GSENM and further increase the economic contributions associated with recreation in GSENM.

Social Conditions and Community Values

Past, present, and reasonably foreseeable projects and activities could contribute to the cumulative impacts in the communities surrounding GSENM. In particular, the fire stabilization projects could contribute to the nonmarket benefits from fire and fuels management decisions within GSENM. Additionally, the projects associated with recreation that improve or add recreational sites in the analysis area could increase the number of visitors to the area, which could contribute to the total overall nonmarket benefits associated with recreation.

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3.22 ENVIRONMENTAL JUSTICE

The following subsections discuss current conditions, trends, and forecasts of environmental justice values associated with uses of BLM-managed lands for the environmental justice analysis area (Kane, Garfield, Beaver, Iron, Piute, San Juan, Washington, and Wayne Counties in Utah and Coconino and Mohave Counties in Arizona). The counties in the analysis area were chosen because they include the counties where GSENM is located (Kane and Garfield in Utah) and counties with communities that rely on the land around and in GSENM for cultural, traditional, recreational, or livelihood purposes that might be impacted by the BLM's management decisions. The discussion focuses on information that is most relevant to the scope of the current BLM planning effort for GSENM.

3.22.1 Affected Environment

Current Conditions

Executive Order 12898 established the responsibility of each federal agency to “make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations” (59 *Federal Register* 7629, February 16, 1994). Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fundamental principles of environmental justice are that everyone has the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

An evaluation of environmental justice impacts requires identification of minority and low-income populations (including Tribal Nations) within the affected area and evaluation of the potential for the alternatives to have disproportionately high and adverse impacts on such populations.

This section provides the first step in the environmental justice analysis: a screening analysis of the environmental justice analysis area for the planning action to identify the presence and location of any environmental justice populations. Evaluation of potential adverse impacts on these populations will take place during the impacts analysis.

Subsequent to the publication of Executive Order 12898, the CEQ, part of the Executive Office of the President, issued guidance for considering environmental justice within the NEPA process (CEQ 1997). This guidance defines minorities as individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

The guidance further defines a minority population as follows: “Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis” (CEQ 1997). The guidance also makes clear that Tribal Nations in the affected area should also be considered in the environmental justice screening analysis. The CEQ guidance does not define what constitutes meaningfully greater. The BLM recommends using a threshold for “meaningfully greater” as 110 percent of the minority population in the reference area (BLM 2022).

The CEQ guidance does not specify how to identify a “low-income population,” but the BLM defines a low-income population as being present if the percentage of people in the region with low income (income that is less than 200 percent of the poverty level) is greater than 50 percent of the area’s total population or is greater than or equal to the percentage of people in the reference area with low income (BLM 2022). For the purposes of this analysis, the thresholds stated above, from the CEQ and the BLM, are used to identify any low-income, minority, and Native American communities in the environmental justice analysis area.

Table 3-120 shows data for potential environmental justice populations in the environmental justice analysis area. The reference group for whether an environmental justice population exists is the state of Utah or Arizona. **Figure 3-54**, Minority Populations near GSENM, and **Figure 3-55**, Low-Income Populations near GSENM, in **Appendix A** show the counties in Utah near and surrounding GSENM, shaded by minority population and low-income population, respectively.

Table 3-120. Environmental Justice Screening for Environmental Justice Analysis Area (2021)

Geography	Low Income (%)	Minority (%)	Native American (%)
Utah Counties			
Garfield County	41.3	11.4	4.8
Kane County	34.9	9.3	3.3
Beaver County	22.0	15.7	1.6
Iron County	39.6	14.6	2.5
Piute County	51.6	4.2	0.2
San Juan County	42.0	55.7	48.8
Washington County	28.9	16.0	1.7
Wayne County	36.0	8.3	1.0
Reference area (Utah)	25.5	22.1	4.8
Arizona Counties			
Coconino County	37.8	46.2	28.3
Mohave County	37.8	23.3	3.3
Reference area (Arizona)	33.0	45.9	5.6

Source: U.S. Department of Commerce 2022

Note: Bold values highlight the populations that meet the environmental justice thresholds.

The percentages of minority populations in Garfield and Kane Counties (11.4 percent and 9.3 percent, respectively) are below the average percentage for Utah (22.1 percent). The percentages of low-income populations in Garfield and Kane Counties (41.3 percent and 34.9 percent, respectively) are above the average for Utah (25.5 percent). Therefore, Garfield and Kane Counties meet the threshold for a low-

income population and an environmental justice community. The Native American population in Garfield County (4.8 percent) is equal to the Native American population in the state, so this meets the threshold for an environmental justice community. San Juan County in Utah has a Native American population of 48.8 percent and a minority population percentage of 55.7 percent, which are both above the threshold for environmental justice communities. Coconino County in Arizona has a Native American population of 28.3 percent, which is above the state average threshold. Both Coconino and Mohave Counties have low-income populations exceeding the low-income threshold in Arizona. All counties in Utah in the environmental justice analysis area, except for Beaver County, have low-income populations above the reference average for Utah (U.S. Department of Commerce 2022).

San Juan County in Utah has a Native American population of 48.8 percent, which is above the state average threshold. It also has a minority population percentage (55.7 percent) above the 50 percent threshold and above the state average threshold. Coconino County in Arizona has a Native American population of 28.3 percent. Both Coconino and Mohave Counties have low-income populations exceeding the low-income threshold in Arizona. All counties in Utah in the environmental justice analysis area, except for Beaver County, have low-income populations above the reference average for Utah (U.S. Department of Commerce 2022).

Trends

Overall demographic trends for analysis area population over the period from 2000 to 2020 are presented in **Section 3.21**, Social and Economic Values. To provide greater detail regarding communities of environmental justice concern, **Table 3-121** shows the low-income population percentage for all counties in the environmental justice analysis area over time. Only Kane County and Piute County showed an increase in low-income percentage from 2015 to 2020 (5.2 and 7.3 percentage points, respectively). The other counties and the reference areas of Utah and Arizona all saw a reduction in low-income percentage.

With the exception of Piute County, the minority population percentage saw an increase in all counties and reference areas from 2015 to 2020 (**Table 3-122**). The percentage of Native American population remained roughly the same throughout the environmental justice analysis area from 2015 to 2020 (**Table 3-123**).

Table 3-121. Low-Income Population Percentage for Environmental Justice Analysis Area (2015–2020)

Geography	2015 (%)	2020 (%)
Utah Counties		
Garfield County	46.7	41.3
Kane County	29.7	34.9
Beaver County	34.8	22.0
Iron County	45.6	39.6
Piute County	44.3	51.6
San Juan County	54.1	42.0
Washington County	39.8	28.9
Wayne County	41.3	36.0
Reference area (Utah)	32.0	25.5
Arizona Counties		
Coconino County	42.0	37.8
Mohave County	45.2	37.8
Reference area (Arizona)	38.8	33.0

Sources: U.S. Department of Commerce 2022

Table 3-122. Minority Population Percentage for Environmental Justice Analysis Area (2015–2020)

Geography	2015 (%)	2020 (%)
Utah Counties		
Garfield County	9.8	11.4
Kane County	8.0	9.3
Beaver County	11.1	15.7
Iron County	13.4	14.6
Piute County	6.8	4.2
San Juan County	54.2	55.7
Washington County	14.8	16.0
Wayne County	7.5	8.3
Reference area (Utah)	20.5	22.1
Arizona Counties		
Coconino County	45.3	46.2
Mohave County	21.8	23.3
Reference area (Arizona)	43.5	45.9

Sources: U.S. Department of Commerce 2022

Table 3-123. Native American Population Percentage for Environmental Justice Analysis Area (2015–2020)

Geography	2015 (%)	2020 (%)
Utah Counties		
Garfield County	1.4	4.8
Kane County	3.6	3.3
Beaver County	0.2	1.6
Iron County	3.0	2.5
Piute County	0.8	0.2
San Juan County	48.2	48.8
Washington County	2.2	1.7
Wayne County	0.6	1.0
Reference area (Utah)	1.7	1.8
Arizona Counties		
Coconino County	28.3	28.3
Mohave County	3.9	3.3
Reference area (Arizona)	5.4	5.6

Sources: U.S. Department of Commerce 2022

The area surrounding GSENM is among the most rural in Utah, with the population density of about 1.9 people per square mile in Kane County and 1 person per square mile in Garfield County (the two counties where GSENM is located; U.S. Department of Commerce 2021). The low population density can impact the local communities by making it more difficult to find employment in the area and by limiting the access to resources and public services. These impacts can place heavier burdens on area environmental justice populations.

Historically, subsistence is a valuable use of BLM-managed lands for Tribes around GSENM. Subsistence plays an important role in the Tribes' cultural identity, social organization, social cohesion, transmission of cultural values, and community and individual well-being (Seebach and Feinberg 2021). Changes in subsistence resource availability would impact opportunities for engaging in subsistence activities potentially increasing social problems. Changes in access to subsistence resources could be more impactful

to Tribes due to the importance of subsistence on spiritual and cultural values and traditions. Subsistence resources are often valuable to low-income populations as well, and impacts on access to subsistence resources could be more impactful to the poorest residents due to the limited resources that are often available to low-income individuals.

Forecasts

It is difficult to project how minority populations and low-income populations will change in the future; however, population forecasts can provide some insights and context to how demographics in the area might change. The population is expected to increase in all counties in the environmental justice analysis area, as well as for the states, from 2025 to 2035 (**Table 3-124**). If the historical trends in minority populations continue, then the increase in population will be met with an increase in minority populations.

Increase in population also could put additional strain on the surrounding communities, public infrastructure and services, and cultural resources, which could put a heavier burden on environmental justice communities.

Table 3-124. Population Forecasts (2025–2035)

Geography	2025	2035	Percentage Change (2025–2035)
Utah Counties			
Garfield County	5,845	6,405	9.6
Kane County	8,684	9,611	10.7
Beaver County	7,408	8,017	8.2
Iron County	59,900	67,803	13.2
Piute County	1,699	1,872	10.2
San Juan County	17,932	19,330	7.8
Washington County	219,019	286,768	30.9
Wayne County	2,985	3,363	12.7
Utah	3,615,036	4,178,317	15.6
Arizona Counties			
Coconino County	152,265	157,881	3.7
Mohave County	235,372	261,192	11.0
Arizona	7,781,973	8,776,952	12.8

Source: Perlich et al. 2017; Arizona Commerce Authority 2022

Table 3-125 shows the forecasted employment for the environmental justice analysis area and the states of Utah and Arizona. All geographic areas are projected to see an increase in employment from 2025 to 2035. This might mean these areas could see a decrease in low-income population, if more people who were unemployed become employed or are employed in higher-paying jobs. However, the percent change for each of the counties is similar to the percent change in population, so if the increase in employment is solely the result of the increase in population, then the change in low-income population might be small. Environmental justice populations tend to have more limited resources and could have heavier burdens of finding employment, especially if the jobs require commuting long distances, so changes in employment can impact environmental justice communities more than other populations.

Table 3-125. Total Employment Forecasts (2025–2035)

Geography	2025	2035	Percentage Change (2025–2035)
Utah Counties			
Garfield County	4,063	4,461	9.8
Kane County	5,554	6,106	9.9
Beaver County	4,712	5,121	8.7
Iron County	29,036	32,971	13.6
Piute County	713	781	9.5
San Juan County	7,738	8,684	12.2
Washington County	123,225	154,444	25.3
Wayne County	2,141	2,414	12.8
Utah	2,373,675	2,728,541	15.0
Arizona Counties Arizona¹			
Coconino County	71,025	72,006	1.4
Mohave County	64,163	64,550	0.6
Arizona	3,384,189	3,436,365	1.5

Source: Perlich et al. 2017; Arizona Commerce Authority 2022

¹Data was reported for 2021, 2022, 2024, and 2031, and was extrapolated for 2025 and 2035 based on the 1-year difference between the years reported.

3.22.2 Environmental Consequences

Refer to **Section F.3I**, Environmental Justice, in **Appendix F**, Analytical Framework, for descriptions of the indicators, analysis areas, and assumptions used for the following analysis.

Issue

- How would BLM management actions impact the environment, health, and livelihoods of communities with environmental justice concerns?

Impacts Common to All Alternatives

As mentioned above in the *Affected Environment* section, environmental justice communities were identified in the analysis area; therefore, the BLM conducted a further analysis to identify any adverse impacts that disproportionately affect these environmental communities. Under all alternatives, there could be adverse impacts on environmental justice communities. These impacts may include impacts on water quality, travel and transportation, and economic contributions; however, the degree to which these impacts disproportionately affect environmental justice communities often depends on the site-specific activities that cause the impacts, and the mitigation measures that the BLM takes can reduce the impacts overall, as described in additional detail below.

Under all alternatives, the BLM's management decisions regarding surface-disturbance activities and vegetation management could lead to degradation of water quality in the analysis area (see **Section 3.4**, Water Resources, for more information on impacts on water quality). The level to which these impacts on water quality could disproportionately affect environmental justice populations depends on the magnitude of the water quality impacts, location of the impacted surface and groundwater, and whether the impacts would affect public water systems. Under all alternatives, proposed mitigation measures will be taken to stabilize soils to prevent runoff, and surface-disturbing actions will be limited to areas that do not pose a threat to public water systems. Under all alternatives, the BLM's management decisions could

impact development of water infrastructure and the use of water rights for the local communities; however, these impacts would depend on the location of the decisions and would require a site-specific analysis at the project level.

Compared with other communities within the region, communities of environmental justice concern may have reduced access for community members to physical and health-related infrastructure. A change in conditions brought on by BLM management may, therefore, result in disproportionate effects as experienced by these populations in cases where such access constraints are exacerbated by changing resource conditions. Similarly, subsistence uses, such as hunting and fishing, may occur in the analysis area. These subsistence uses can contribute to meeting the nutritional dietary needs of households with limited incomes. Depending on the nature and degree of subsistence activity, BLM management actions could adversely affect access to subsistence resources (for example, by limiting vehicle access to areas used for subsistence hunting among communities of environmental justice concern). The degree to which such effects would occur would be speculative to assert, however, at the current scale of analysis. Site-specific NEPA analysis would be required to ascertain the degree to which these populations would be impacted because the specific nature of effects is dependent upon site-specific considerations that are not presently known.

Under all alternatives, the BLM-authorized activities within GSENM that have the potential to contribute to emissions and affect air quality include prescribed fire activities, which could increase smoke in the analysis area; livestock grazing operations; and travel and transportation management, which could increase dust in the analysis area. However, the BLM would take measures to limit the impacts of activities on air quality, and any impacts on air quality would likely affect the local communities evenly, regardless of race or ethnicity identity or low-income status. Prescribed fires could lead to beneficial impacts, including the prevention of significantly worse (and unplanned) emissions of unmanaged wildfire and significant damage to property and cultural resources, among others. The extent to which these impacts would disproportionately impact environmental justice communities would require a site-specific analysis to ascertain the degree to which these populations would be impacted because the specific nature of effects is dependent upon site-specific considerations that are not presently known. See **Section 3.1**, Air Resources, and **Section 3.13**, Fire and Fuels Management, for more detail.

Under all alternatives, the BLM's management decisions could result in impacts on travel and transportation management. Certain designations on BLM-managed land can contain restrictions on travel that adversely affect transportation and access including RMAs, special designations such as ACECs and WSAs, and management of lands with wilderness characteristics. While these impacts affect all communities, environmental justice populations might be disproportionately impacted due to limited methods of mitigating these impacts or the heavier burden on environmental justice populations to alter their commutes due to impacts on travel and transportation. Additionally, there could be disproportionate impacts on environmental justice communities if the BLM's management decisions restrict access to culturally significant resources or areas of interest to certain environmental justice communities, such as Tribal Nations. See **Section 3.7**, Tribal Interests, and **Section 3.18**, Travel Management, for more information.

Oak harvesting is an important traditional use for tribal members in GSENM, and pinyon and juniper is often harvested for firewood. The BLM's management decisions could disproportionately impact environmental justice communities who rely on wood harvesting for heating sources or other uses;

however, impacts on use of wood for heating sources could also improve air quality for the surrounding community, including environmental justice populations. These impacts would be site specific and depend on the relative location of the decision in relation to the environmental justice communities, and the location and concentration of the wood use. Under all alternatives, the BLM would continue to coordinate and consult with tribes with ties to GSENM. Also, the BLM would implement mitigation measures that could reduce impacts on tribal communities, such as impacts on access to timber and wood harvesting resources, sustenance resources, and cultural and spiritual resources. See **Section 3.6**, Cultural Resources, **Section 3.7**, Tribal Interests, and **Section 3.15**, Forestry and Woodland Products, for more information.

Under all alternatives, the BLM's decisions on fire and fuels management could protect important cultural and tribal resources by preventing catastrophic wildfires. These management decisions could provide beneficial impacts on the local communities and could benefit environmental justice populations, due to the importance of these culturally significant resources and areas to tribal members. See **Section 3.7**, Tribal Interests, and **Section 3.13**, Fire and Fuels Management, for more information.

Under all alternatives, there could be impacts on visual and sound resources; however, these impacts would depend on site-specific projects, and they may affect all communities regardless of race or ethnic identities or low-income status. Site-specific NEPA analysis would be required to ascertain the degree to which these populations would be impacted because the specific nature of effects is dependent upon site-specific considerations that are not presently known. See **Section 3.10**, Visual Resources, **Section 3.11**, Dark Night Skies, and **Section 3.12**, Natural Soundscapes, for more information.

Under all alternatives, GSENM contributes to the local economy by providing jobs, labor income, and economic output. This contribution to the economy impacts the community as a whole; however, it tends to be more impactful on environmental justice communities by providing employment opportunities and public services to those who are low income or those who might have fewer resources to seek out employment and services elsewhere. On the other hand, increases in recreation- and tourism-related industries could adversely impact environmental justice communities by attracting second homeowners and driving up housing costs or increasing competition for jobs by attracting nonlocal job seekers (especially seasonal workers in recreation-related industries). Refer to the discussion in **Section 3.21**, Social and Economic Values, for more information on specific industries present in the analysis area and current trends in local employment.

Alternative A

Under Alternative A, surface-disturbing activities would be avoided in drinking water source-protection zones and culinary water sources, and the BLM would develop and implement mitigation measures that could limit impacts that pose a threat to public water systems, which could reduce the impacts on water quality for environmental justice communities. However, Alternative A would likely be less protective against impacts on water quality than Alternative B. Therefore, under Alternative A, there could be more adverse impacts on water quality than under Alternatives B, C, and D. These impacts would likely affect the whole population in the community equally, regardless of race or ethnic identity or low-income status. Site-specific NEPA analysis would be required to ascertain the degree to which these populations would be impacted because the specific nature of effects is dependent upon site-specific considerations that are not presently known. Therefore, environmental justice communities would not likely be disproportionately impacted by any water quality effects from the BLM's management decisions.

Under Alternative A, there would be no impact on travel and transportation management. Route maintenance is not described in the 2020 Approved RMPs, which means under Alternative A, there could be public safety concerns on certain routes due to a lack of routine maintenance or improvements. Environmental justice communities could be disproportionately impacted if, due to the lack of route maintenance, certain routes closed and restricted tribal access to culturally significant resources or areas of interest. Route closures could especially impact populations who rely on access to subsistence resources for sustenance and spiritual and cultural traditions and values. However, the impacts from route closures depend on the location and would require a site-specific analysis. Additionally, under Alternative A, the counties and local governments would likely take up most of the route maintenance, so the impacts would likely be minimal.

Under Alternative A, there would continue to be land open to noncommercial harvest of woodland products. There would be no change in access to timber harvest for environmental justice communities, such as Tribal Nations; therefore, environmental justice communities' access to products and resources would not be impacted; however, environmental justice communities could be impacted from potential adverse air quality impacts from wood burning.

Under Alternative A, economic contributions would continue from the BLM's management decisions, which would continue to support the community as a whole, as well as environmental justice populations, through employment, labor income, economic output, public services, and many nonmarket benefits. However, there could continue to be negative impacts from land use such as recreation on cultural resources and other important resources to environmental justice communities.

Alternative B

Alternative B would likely be more protective against water quality impacts than Alternative A because it allows for maintenance of existing water developments to protect GSENM objects, and proactive management to protect and restore the quality of water in GSENM. This means there would likely be less adverse impacts on the surrounding communities, including environmental justice communities, from water quality under Alternative B compared with Alternative A.

Under Alternative B, routes could be maintained and improved by the BLM to meet public health and safety needs. On the other hand, under Alternative B, there would be an increase in land closed to OHV use of over 950,000 acres, compared to Alternative A. This could adversely and disproportionately impact environmental justice populations if the increase in acres closed to OHV travel would restrict tribal members from accessing important cultural and subsistence resources.

Under Alternative B, the BLM would continue to allow noncommercial harvest of woodland products in many areas, except for in WSAs, lands with wilderness characteristics, areas undergoing restoration, and near riparian areas. This means there could be impacts on environmental justice communities from the BLM's management decisions on woodland products. However, the reduction in timber harvesting for fuel could improve the surrounding air quality, which would impact all communities, including environmental justice communities.

Under Alternative B, the BLM's management decisions would continue to support the community and provide employment, public services, economic output, and nonmarket benefits and ecosystem services. Under Alternative B, there could be an increase in nonmarket values associated with more protected

lands, which would likely impact all communities in the surrounding area. There would likely be no change to economic contributions from recreation, and there could continue to be negative impacts from land use such as recreation on cultural resources and other important resources to environmental justice communities. See **Section 3.21**, Social and Economic Values, for more information on economic contributions from BLM management decisions.

Alternative C

Alternative C would likely be more protective against water quality impacts than Alternative A because it prohibits new water developments, which could contribute to soil erosion and decrease water quality in groundwater and surface water. This means that under Alternative C, there would likely be less adverse impacts on the surrounding communities, including environmental justice communities, from water quality than under Alternative A.

Under Alternative C, impacts on the environmental justice populations due to route maintenance would be the same as under Alternative B. BLM management decisions regarding route maintenance under Alternative C could provide public health and safety benefits. On the other hand, under Alternative C, there would be an increase in land closed to OHV use of 1,148,000 acres, compared to Alternative A. This increase would mean that approximately 62 percent of the land in GSENM would be closed to OHV travel. This could adversely and disproportionately impact environmental justice populations if the increase in acres closed to OHV travel would restrict tribal members from accessing important cultural and subsistence resources.

Similar to under Alternative B, under Alternative C, the BLM would continue to allow noncommercial harvest of woodland products in many areas. The impacts from the BLM's management decisions regarding woodland products on environmental justice populations, through reductions in access to products and potential air quality increases, would be the same as under Alternative B.

Under Alternative C, similar to under Alternative B, the BLM's management decisions would continue to support the local economy and community through jobs, income, and economic output, and there would likely be no change in economic contributions from recreation. Similar to Alternative B, there could be an increase in nonmarket values associated with more protected lands under Alternative C, which would likely impact all communities in the surrounding area. There would likely continue to be negative impacts from land use such as recreation on cultural resources and other important resources to environmental justice communities, similar to Alternatives A and B. See **Section 3.21**, Social and Economic Values, for more information on impacts on economic contributions and nonmarket values from BLM management decisions.

Alternative D

Under Alternative D, the impacts on environmental justice communities from water quality would be similar to those described under Alternative C. Alternative D would likely result in less adverse impacts on the surrounding communities, including environmental justice communities, from water quality than Alternative A.

Under Alternative D, impacts on the environmental justice populations due to route maintenance would be the same as under Alternatives B and C. Compared with Alternative A, Alternative D would likely provide increased public health and safety benefits. Under Alternative D, however, the BLM would manage

1,638,800 acres as closed to OHV travel, which is 1,636,000 acres more than Alternative A and the most acres closed to OHV travel of all alternatives. This increase would mean that approximately 88 percent of the land in GSENM would be closed to OHV travel. This could negatively impact environmental justice communities if tribal members would be restricted in their access to culturally significant and subsistence resources or areas of interest.

Under Alternative D, the BLM would limit noncommercial timber harvest and commercial timber harvest. This would likely result in more restrictions on access to products for environmental justice populations who rely on wood for heating sources more than the other alternatives. However, this could result in improved air quality due to a reduction in wood burning, compared with the other alternatives.

Similar to under Alternatives B and C, the BLM's management decisions would continue to support the local economy and community under Alternative D. Under Alternative D, there could be a reduction in economic contributions from recreation, such as fewer jobs, less labor income, and less economic output, if there is a decrease in recreational visitors due to the increase in restrictions to land use and the increase in areas closed to OHV travel. However, there could be an increase in visitors who are seeking solitude. These impacts on the economy could affect environmental justice populations, especially low-income communities who may have a heavier burden by commuting longer distances for work due to the reduction in recreation-related employment and output. However, the magnitude of this impact would depend on the overall change in visitation numbers. Additionally, the jobs associated with recreation and tourism are often short-term or seasonal positions, which have a more limited impact on local low-income individuals who often need more steady, consistent employment to increase overall household income. If there are fewer visitors overall, there could be a reduction in negative impacts on cultural resources, which would likely impact environmental justice populations. Under Alternative D, there could be an increase in nonmarket benefits associated with more protected lands, compared with Alternatives A, B, and C, which could be especially impactful to minority populations and Tribal Nations who use GSENM for spiritual and traditional uses.

Cumulative Impacts

Past, present, and reasonably foreseeable projects and activities in the analysis area communities could contribute to cumulative impacts on environmental justice communities. As population and recreation visitors are expected to increase around GSENM, there is greater risk of negative impacts such as disturbance or destruction of cultural resources. Alternatives B, C, and D would reduce the potential for cumulative impacts on cultural resources due to limiting access to certain areas from OHV travel, compared with Alternative A. The reduction in impacts, under Alternative B, C, D, on cultural resources would likely benefit environmental justice populations more than other populations due to the importance and value placed on cultural resources by Tribes and other minority populations.

3.22.3 References

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Chapter 4. Consultation and Coordination

4.1 INTRODUCTION

This chapter documents the BLM’s public outreach, consultation, and coordination efforts throughout the preparation of this RMP/EIS. The Council on Environmental Quality’s regulations (40 CFR 1506.6) provide guidance for ensuring public involvement in land use planning in accordance with NEPA. Title II, Section 202 of the FLPMA directs the BLM to coordinate its land use planning with that of tribes, other federal agencies, and state and local governments, to the extent that those external plans are consistent with the laws governing the BLM-managed surface lands. Presidential Proclamation 10286 also directs the BLM to undertake monument planning with maximum public involvement, including, but not limited to, consultation with federally recognized Tribal Nations and state and local governments. In the development and implementation of the management plan, opportunities will be maximized pursuant to applicable legal authorities, for shared resources, operational efficiency, and cooperation.

4.2 PUBLIC COLLABORATION AND OUTREACH

In developing the RMP/EIS, the BLM solicited public input during the public scoping period associated with the NOI. The BLM’s public outreach and collaboration are ongoing and will continue throughout the development of the RMP/EIS. After the release of the draft RMP/EIS, an additional public comment period will occur.

4.2.1 Scoping Process

Scoping is an early and open process that helps the BLM determine the scope of issues to be addressed; scoping also helps extract the overarching issues that may be added to those addressed during the planning process. These issues help define the scope of the analysis for the RMP/EIS; they may also be used to develop the EIS alternatives. Guidance for implementing public involvement under NEPA is codified in 40 CFR 1506.6.

As defined under NEPA, the scoping period began with the publication of the notice of intent, titled “Notice of Intent to Prepare a Resource Management Plan for the Grand Staircase-Escalante National Monument in Utah and an Associated Environmental Impact Statement for the Paria River District Office, Kanab, Utah,” in the [Federal Register](#) on July 29, 2022. The notice of intent initiated the public scoping process for the RMP/EIS. During this period, the BLM sought public comments to determine relevant issues that could influence the scope of the environmental analysis, including alternatives, and to guide the process for developing the RMP/EIS.

The BLM held five public scoping meetings during the scoping process. The BLM hosted three in-person meetings (August 24, August 31, and September 7, 2022) and two virtual public scoping meetings (August 17 and August 30, 2022) as part of the ongoing land use planning for GSENM. These meetings provided the public with opportunities to speak with BLM staff and management regarding the development of the RMP/EIS. The BLM received 416 unique written submissions during the public scoping period, comprising 1,791 unique substantive comments. Some of the most common issues commented on included recreation and travel management components of alternatives, and issues and analytic frameworks for rangeland health, livestock grazing management, recreation use, visitor services, travel, transportation, and access management.

Additional information about the public scoping process, including the material presented at the meeting and the final scoping report, can be found here: <https://eplanning.blm.gov/eplanning-ui/project/2020343/510>.

4.3 CONSULTATION AND COORDINATION

This section documents the consultation and coordination efforts undertaken by the BLM throughout the RMP/EIS process. During the land use planning process, the BLM coordinates with a variety of organizations who have interests in the planning area. These organizations are largely governmental bodies with responsibility for creating, administering, and monitoring policy on public lands within the planning area. Consultation and coordination with these parties will occur throughout the development of the RMP/EIS.

4.3.1 Cooperating Agencies

The regulations implementing NEPA allow federal agencies to invite Tribal Nations, state and local governments, and other federal agencies to serve as cooperating agencies during the NEPA process. To serve as a cooperating agency, the potential agency or government entity must have either jurisdiction by law or special expertise relevant to the environmental analysis.

The BLM invited 27 Tribal Nations, state and local governments, and other federal agencies to be cooperating agencies (see Table 1-2 in the final scoping report [<https://eplanning.blm.gov/eplanning-ui/project/2020343/510>]). Of these, 13 agencies signed formal memoranda of understanding with the BLM to share knowledge and resources throughout the development of the RMP/EIS.

Table 4-1, below, details the Tribal Nations; federal, state, and local agencies; and other organizations that participated as cooperating agencies for the RMP/EIS.

Table 4-1. Cooperating Agencies for the GSENM RMP/EIS Planning Process

Agency Type	Agency Name
Federal	NPS Intermountain Regional Office and U.S. Forest Service (Dixie National Forest)
State	State of Utah
Local	Escalante City, Garfield County Commission, Kanab City, Kane County Commission, Kane County Water Conservancy District, Tropic Town, and Washington County Water Conservancy District
Tribal	Hopi Tribe of Arizona, Kaibab Band of Paiute Indians, and Navajo Nation

To date, the BLM has hosted eight cooperating agencies meetings to familiarize cooperators with the RMP/EIS development process and to review and provide feedback on the scoping report, draft alternatives, and the Draft RMP/EIS.

Future meetings will be held following the release of the draft RMP/EIS to incorporate the agencies' feedback and to refine and finalize content.

4.3.2 Tribal Nations

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, requires federal agencies to coordinate and consult on a government-to-government basis with sovereign Native American tribal governments whose interests may be directly and substantially affected by activities on federally administered lands. Consultation with federally recognized Native American tribes is also required under

NEPA, FLPMA, and Proclamation 10286. Additionally, numerous laws, regulations, and guidance require tribal consultation to identify any Native American cultural values, religious beliefs, or traditional practices that could be affected by BLM actions on federal lands.

The BLM has completed Tribal coordination and formal government-to-government consultation throughout the duration of the planning process. The BLM invited the above-listed Native American Tribes to initiate in government-to-government consultation in September 2022 and February 2023. Within these letters, Tribes were also invited to apply for cooperating agency status. Thus far, the Navajo Nation, the Hopi Tribe of Arizona, the Kaibab Band of Paiute Indians, and the Paiute Indian Tribe of Utah have cooperating agency status. Since the time of invitation to participate in government-to-government consultation, the BLM held a government-to-government meeting in June 2023. This meeting included participation from the following Tribes: Ute Mountain Ute Tribe, Navajo Nation, and Pueblo of Tesuque. Subsequent government-to-government consultation is planned for August 2023.

Tribal co-stewardship efforts have been a top priority during this planning effort, to give Tribes an opportunity to collaborate with the BLM in a format that offers them agency in land management decisions. The first Tribal co-stewardship meeting was held in November 2022. Representatives from the U.S. Department of the Interior, Bureau of Indian Affairs, BLM, and several Tribal Nations met to discuss the possibility of a co-stewardship agreement. Since this original meeting, the BLM hosted two additional Tribal co-stewardship meetings in January and April 2023. A desired product of these co-stewardship meetings was the development of an Inter-Tribal Working Group, which would consist of designated Tribal representatives who front the co-stewardship program. Since the development of this Inter-Tribal Working Group, the BLM's partner organization Grand Staircase-Escalante Partners, has hosted two co-stewardship meetings for Tribal representatives and BLM staff. An in-person meeting for designated Inter-Tribal Working Group representatives is planned for September 2023. During these meetings, the BLM has received valuable input from Tribes regarding the RMP and associated EIS and Science Plan. These meetings are also invaluable to establish a Tribal co-stewardship agreement in GSENM in the future. Members from the following Tribes have attended one or multiple Tribal co-stewardship meetings: the Navajo Nation, the Ute Mountain Ute Tribe, the Paiute Indian Tribe of Utah, the Hopi Tribe of Arizona, the Kaibab Band of Paiute Indians, the Pueblo of Tesuque, the Zuni Tribe of the Zuni Reservation, the Shivwits Band of Paiute Indians, and the Ute Indian Tribe of the Uintah and Ouray Reservation.

With facilitation from Grand Canyon Trust, the BLM has hosted members of the Hopi Tribe and the Navajo Nation for field visits within GSENM. These visits are an opportunity for Tribes to reconnect with the land, visit cultural resources, and provide their perspectives on cultural resource management in GSENM. The goal is to continue hosting visits such as these. During the Inter-Tribal Working Group meeting planned for September 2023, 2 days will be dedicated for field visits so Tribes can reconnect with these landscapes and resources.

4.3.3 Additional Consultation

U.S. Fish and Wildlife Service

Proclamation 10286 directs the BLM to consult with other federal land management agencies in the local area during the development of the RMP/EIS. Under ESA Section 7(a)(2), the BLM must ensure the proposed action is not likely to jeopardize the continued existence of federally listed threatened and endangered species or adversely modify designated critical habitat. The Section 7 consultation between the BLM and the USFWS will begin after the BLM has a proposed plan. The BLM will coordinate with the

USFWS to develop a biological assessment. This assessment will help determine whether formal consultation and the preparation of a biological opinion are necessary.

State Historic Preservation Office Consultation

The principal federal law addressing cultural resources is the NHPA, as amended (54 USC 300101 et seq.) and its implementing regulations found at 36 CFR § 800.3. These regulations, commonly referred to as the Section 106 process, describe the procedures for identifying and evaluating historic properties, for assessing the impacts of federal actions on historic properties, and for project proponents consulting with appropriate agencies to avoid, reduce, or minimize adverse effects. Historic properties are cultural resources that are over 50 years old and that meet specific criteria for listing on the National Register.

The BLM meets its obligations under the NHPA through the implementation of the regulations at 36 CFR 800, as well as through BLM cultural resources manuals and handbooks (H-8100 Series and the BLM tribal relations manuals and handbooks [H-1780 Series]); the State Protocol Agreement between the BLM and Utah SHPO; the Small-Scale Undertakings Programmatic Agreement between the Utah BLM, SHPO, and the Advisory Council on Historic Preservation; the Manner in Which BLM will Meet its Responsibilities under the NHPA National Programmatic Agreement between the BLM, Advisory Council on Historic Preservation, and National Conference of State Historic Preservation Offices; the Solar Energy Development on Lands Administered by the BLM Programmatic Agreement between the BLM, Arizona SHPO, California SHPO, Colorado SHPO, New Mexico SHPO, Nevada SHPO, Utah SHPO, and Advisory Council on Historic Preservation; and the Coordination of Cultural Resource Consultation Requirements under Section 106 of the NHPA and Utah State Antiquities Act Programmatic Agreement between Utah Department of Transportation and the Utah BLM.

During preparation of this RMP/EIS, the BLM coordinated with state agencies, local counties, the UT SHPO, and other consulting parties in compliance with Section 106 of the NHPA. The BLM conducted a consultation with the Utah SHPO in September 2022, per 36 CFR § 800.4, for the GSENM RMP/EIS. The consultation included a description of the undertaking and area of potential effect, a summary of Native American Tribal consultation and public participation and comment, and identification efforts of historic properties within the area of potential effect. The Utah SHPO concurred on the consultation.

Following SHPO concurrence, the BLM invited the following consulting parties to participate in the NHPA Section 106 process to provide input on historic properties that may be affected by proposed decisions and to provide other input:

- Utah SHPO
- Kane County Commission
- Garfield County Commission
- Grant Canyon Trust
- Southern Utah Wilderness Alliance
- Utah Rock Art Research Association
- Old Spanish Trail Association
- Hole-in-the-Rock Trail Association
- NPS, National Historic Trails Office

- Western Watersheds Project
- Public Lands Policy Coordinating Office
- Glen Canyon Recreation Area staff
- All consulting tribes:
 - All Pueblo Council of Governors
 - Kaibab Band of Paiute Indians
 - Navajo Nation
 - Paiute Indian Tribe of Utah
 - Shivwits Band of Paiute Indians
 - Indian Peaks Band of Paiute Indians
 - Kanosh Band of Paiute Indians
 - Cedar Band of Paiute Indians
 - Koosharem Band of Paiute Indians
 - Pueblo of Acoma
 - Pueblo of San Felipe
 - Pueblo of Tesuque
 - Zuni Tribe of the Zuni Reservation
 - San Juan Southern Paiute Tribe of Arizona
 - Hopi Tribe of Arizona
 - Ute Mountain Ute Tribe
 - Ute Indian Tribe of the Uintah and Ouray Reservation

These consulting parties were invited to participate in a virtual NHPA Section 106 consultation in August 2022. The purpose of this meeting was to inform consulting parties on the goals for the new GSENM RMP/EIS and engage all consulting parties to participate in NHPA Section 106 consultation. During this consultation, the BLM initiated Section 106 consultation and asked consulting parties for comment on the identification of historic properties and potential effects on historic properties. The BLM involved the public in the Section 106 process through BLM’s national ePlanning website and NEPA public scoping meetings. The National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers states, in the preamble under the section titled “The Public,” that the BLM may use its agency procedures or BLM NEPA procedures to involve the public (BLM 2012). The BLM notified stakeholders of the scoping period, which began July 29, 2022, and ended September 27, 2022. The BLM held public meetings for NEPA and NHPA Section 106 in Escalante, Kanab, and Panguitch, Utah, and two virtual public meetings. The public was encouraged to provide NEPA- and NHPA Section 106-related comments during this time. Further consultation with consulting parties and the public will commence when the draft RMP/EIS is published.

4.4 MONUMENT ADVISORY COMMITTEE AND RESOURCE ADVISORY COUNCIL

Proclamation 10286 provides that “the Secretary shall maintain one or more advisory committees under the Federal Advisory Committee Act (5 USC App.) to provide information and advice regarding the development of the above-described management plans, and, as appropriate, management of the monument.” A GSENM monument advisory committee (MAC) charter was signed on September 5, 2018;

it memorialized a 15-member committee that includes state and local government officials, tribal members, representatives of the recreation community, local business owners, and private landowners. The MAC will advise GSENM managers per the MAC charter. The BLM will engage with the MAC throughout the RMP/EIS planning effort and consider the members' advice and recommendations on the issues and approaches for meeting objectives identified in Proclamation 10286.

To date, there have been four MAC meetings to discuss the GSENM RMP/EIS planning effort. These meetings were on July 12, October 18, and December 13, 2022; and June 27, 2023. A future meeting is scheduled for September 12, 2023.

4.5 LIST OF PREPARERS

Table 4-2 lists the people primarily responsible for preparing the RMP/EIS.

Table 4-2. List of Preparers for the GSENM RMP/EIS

Name	Project Role
Bureau of Land Management	
Scott Whitesides	Project Manager; Contracting Officer's Representative
Harry Barber	Paria River District Manager
Adé Nelson	GSENM Manager
Artemisia Turiya	Planning and Environmental Coordinator; Vegetation Group Lead
David Hercher	Public Affairs Specialist
Erik Vernon	Air Quality and Climate; Soundscapes
Sandra Zarzycka	Cultural Resource Management; Native American Religious Concerns and Tribal Use; History, Historic Resources, and Sense of Place
Bill Stevens	Environmental Justice; Social and Economic Values
Les Gonyer	Hydrology
Jared Dalebout	Hydrology; Wild and Scenic Rivers
Cassie Mellon	Fisheries
Brandon Johnson	Lands and Realty
Allysia Angus	Landscape Characteristics, including Visual Resources, Scenery, Dark Night Skies, and Natural Soundscapes; Scenic Routes
Dustin Rooks	Noxious Weeds and Invasive, Nonnative Plants; Vegetation Resilience and Conservation; Threatened and Endangered Species
Alan Titus	Paleontological Resources and Geology; Science
Sean Stewart	Rangeland Health and Livestock Grazing Management
Jason Bybee	Rangeland Health and Livestock Grazing Management
Jabe Beal	Recreation Use and Visitor Services; Wilderness Study Areas; Lands with Wilderness Characteristics; Travel, Transportation, and Access; Old Spanish National Historic Trail
Clay Stewart	Recreation Use and Visitor Services; Wilderness Study Areas; Lands with Wilderness Characteristics; Travel, Transportation, and Access
Rob Sweeten	Old Spanish National Historic Trail
Ray Kelsey	Wild and Scenic Rivers; Areas of Critical Environmental Concern
Raven Chavez	Soils
Shawn Peterson	Fire and Fuels
Cameron McQuivey	Wildlife; Threatened and Endangered Species
Jason Bybee	Rangeland Health; Forestry and Woodlands
Jason Stewart	GIS
Evan Glenn	Recreational Use and Visitor Services

Name	Project Role
Environmental Management and Planning Solutions Inc. (EMPSi)	
Luke Hodges	Project Manager; Wildlife; Threatened and Endangered Species
Andrew Wilkins	Assistant Project Manager; Cultural Resource Management; Native American Religious Concerns and Tribal Use; History, Historic Resources, and Sense of Place
James Hereford	Assistant Project Manager
Bronson Pace	Project Coordinator
Holly Prohaska	Senior NEPA Adviser/Quality Assurance Specialist
Meredith Linhoff	Natural Resources Team Lead
Angie Adams	Resource Use and Special Designations Team Lead
Zoe Ghali	Community Outreach Adviser; Socioeconomics and Environmental Justice Lead
Alli Yamnitsky	Public Involvement (including MAC assistance); Wild and Scenic Rivers; Areas of Critical Environmental Concern; Old Spanish National Historic Trail; Wilderness Study Areas; Scenic Byways
Clayton McGee	Comment Analysis
Liza Schill	Project Record
Amy Cordle	Air Quality and Climate
Shine Roshan	Air Quality and Climate
Erin Hudson	Cultural Resource Management; Native American Religious Concerns and Tribal Use; History, Historic Resources, and Sense of Place
Camila Reiswig	Environmental Justice; Social and Economic Values
Shannon Regan	Noxious Weeds and Invasive, Nonnative Plants; Vegetation Resilience and Conservation
Morgan Triegeer	Noxious Weeds and Invasive, Nonnative Plants; Fire and Fuels
Andy Spellmeyer	Rangeland Health and Livestock Grazing Management
Derek Holmgren	Recreation Use and Visitor Services; Travel, Transportation, and Access Management
Noelle Crowley	Recreation Use and Visitor Services; Travel, Transportation, and Access Management
Amy Lewis	Wild and Scenic Rivers; Areas of Critical Environmental Concern; Old Spanish National Historic Trail; Wilderness Study Areas; Scenic Byways
Emma Davis	Lands with Wilderness Characteristics
Jenna Jonker	GIS
Marcia Rickey	GIS
Rob Lavie	GIS
SWCA Environmental Consultants	
Matt Westover	Project Manager; Lands and Realty
Arianna Disser	Hydrology (groundwater, surface water, wetlands, riparian areas, floodplains, and water quality); Soils and Biological Soils Crusts
Victoria Edwards	Lands and Realty
Chris Bockey	Landscape Characteristics, including Visual Resources, Scenery, Dark Night Skies, and Natural Soundscapes; Scenic Routes
Kevin Rauhe	Landscape Characteristics, including Visual Resources, Scenery, Dark Night Skies, and Natural Soundscapes; Scenic Routes
Vicki Meyers	Paleontological Resources and Geology; Science
Mandy Bengtson	Soils and Biological Soils Crusts
Gretchen Semerad	Forestry and Woodlands

Bureau of Land Management (BLM)

Scott M. Whitesides – Planning and Environmental Specialist/Project Manager. Scott has a Master of Arts in Maritime Studies from East Carolina University and a Bachelor of Arts in Anthropology from Utah State University. He has more than 13 years of experience with the BLM and is currently a Planning and Environmental Specialist in the BLM Utah State Office.

Harry Barber – Paria River District Manager. Harry has a Master of Science in Wildlife Management and a Bachelor of Science in Wildlife and Range Management, both from Brigham Young University. He has more than 32 years of federal service and is currently the District Manager in the BLM Paria River District Office.

Adé Nelson – GSENM Manager. Adé has an Associate of Science in Business Administration from Utah Tech University. She has more than 13 years as a project manager and is currently the GSENM Manager in the BLM Paria River District Office.

Artemisia Turiya – Planning and Environmental Coordinator; Vegetation Group Lead. Artemisia has a Bachelor of Arts in both Physics and Mathematics from the University of Utah, a Master of Natural Resource Management from Utah State University, and a Graduate Certificate in NEPA from Utah State University. She has more than 12 years in federal lands management and environmental compliance and is currently a Planning and Environmental Coordinator in the BLM Paria River District Office.

David Hercher – Public Affairs Officer. David has a Master's in Business Administration with Concentration in Project Management from Keller Graduate School of Management. He has more than 26 years in public affairs and is currently a District Public Affairs Officer in the BLM Paria River District Office.

Erik Vernon – Air Quality and Climate; Soundscapes. Erik has a Master of Meteorology from the University of Utah. He has more than 21 years in atmospheric sciences for the federal government and is currently an Air Resource Specialist in the BLM Utah State Office.

Sandra Zarzycka – Cultural Resource Management; Native American Religious Concerns and Tribal Use; History, Historic Resources, and Sense of Place. Sandra has a Master of Science in Applied Geography with a focus in Environmental Archaeology from the University of North Texas and a Bachelor of Arts in Anthropology with a minor in Geology from the University of Wyoming. She has more than 8 years of experience in archaeology and is currently an Archeologist for GSENM.

Bill Stevens – Environmental Justice; Social and Economic Values. Bill has a Master of Business Administration from the University of Chicago and a PhD from the University of Illinois. He has more than 25 years of federal service and is currently an Outdoor Recreation Planner for the Moab Field Office.

Les Gonyer – Hydrology. Les has a Bachelor of Science from the University of Minnesota. He has more than 38 years of experience as a hydrologist for the U.S. Department of Agriculture and is currently a contracted hydrologist for the Paria River District Office.

Jared Dalebout – Hydrology; Wild and Scenic Rivers. Jared has a Bachelor of Science in Geology from Weber State University. He has more than 17 years of experience with the BLM and is currently an Aquatic Program co-lead in the BLM Utah State Office.

Cassie Mellon – Fisheries. Cassie has a Bachelor of Science in Environmental Science from Oregon State University and a Master of Science in Fisheries from the University of Alaska Fairbanks. She has more than 15 years of experience with the BLM and the UDWR and is currently a Fisheries Program member in the BLM Utah State Office.

Brandon Johnson – Lands and Realty. Brandon has a Bachelor of Science in Geology from Southern Utah University. He has more than 23 years of experience with the U.S. Department of the Interior and is currently a Realty Specialist in the BLM Utah State Office.

Allysia Angus – Landscape Characteristics, including Visual Resources, Scenery, Dark Night Skies, and Natural Soundscapes; Scenic Routes. Allysia has a Master of Landscape Architecture and a Bachelor of Arts in Communication from University of Tennessee at Martin. She has more than 23 years of experience with the BLM and is currently a Landscape Architect in the Paria River District Office.

Dustin Rooks – Noxious Weeds and Invasive, Nonnative Plants; Vegetation Resilience and Conservation; Threatened and Endangered Species. Dustin has a Bachelor of Science in Biology with a Botany emphasis and a minor in Geology from Southern Utah University. He has more than 21 years of experience with the BLM and is currently a Botanist in the Color Country District Office.

Alan Titus – Paleontological Resources and Geology; Science. Alan has a Doctorate in Philosophy from Washington State University and a Master of Science from the University of Arkansas. He has more than 23 years of experience with the BLM and is currently a Paleontologist in the Paria River District Office.

Sean Stewart – Rangeland Health and Livestock Grazing Management. Sean has a Bachelor of Arts in Botany from Southern Utah University. He has more than 26 years of experience with the BLM and is currently a Rangeland Management Specialist in the Paria River District Office.

Jason Bybee – Rangeland Health and Livestock Grazing Management. Jason has a Bachelor of Science in Biology with an emphasis in Botany from Southern Utah University. He has more than 14 years of experience with the BLM and is currently a Rangeland Management Specialist for GSENM.

Jabe Beal – Recreation Use and Visitor Services; Wilderness Study Areas; Lands with Wilderness Characteristics; Travel, Transportation, and Access; Old Spanish National Historic Trail. Jabe has a Master of Arts in Recreation Management from the University of Nebraska. He has more than 18 years of experience with the BLM and is currently an Outdoor Recreation Planner for GSENM.

Clay Stewart – Recreation Use and Visitor Services; Wilderness Study Areas; Lands with Wilderness Characteristics; Travel, Transportation, and Access. Clay has a Bachelor in Business Management from Southern Utah University and a Graduate in Parks, Recreation, and Tourism from the University of Utah. He has more than 22 years of experience with the BLM and is currently an Outdoor Recreation Planner for GSENM.

Rob Sweeten – Old Spanish National Historic Trail. Rob has a Bachelor of Landscape Architecture and Environmental Planning from Utah State University. He has more than 19 years of experience with the BLM and is currently a BLM Old Spanish Trail Co-Administrator and Utah Historic Trails Lead in the BLM Utah State Office.

Ray Kelsey – Wild and Scenic Rivers. Ray has a Master of Parks, Recreation, and Tourism from the University of Utah. He has more than 20 years of experience with the BLM and is currently a National Conservation Lands State Program Lead in the BLM Utah State Office.

Raven Chavez – Soils. Raven has a Bachelor of Science in Crop and Soil Science and a Bachelor of Science in Natural Resources from Oregon State University. She has more than 5 years of experience of federal service and is currently a Soil Scientist for GSENM.

Shawn Peterson – Fire and Fuels. Shawn has a Bachelor of Science in Rangeland Management from Utah State University. He has more than 26 years of experience of federal service and is currently a Supervisory Fuels Management Specialist in the Color Country and Paria River Districts Division of Fire Management.

Cameron McQuivey – Wildlife; Threatened and Endangered Species. Cameron has a Bachelor of Arts in Zoology from Southern Utah University. He has more than 17 years of experience as a wildlife biologist and is currently a Wildlife Biologist for GSENM.

Jason Stewart – GIS. Jason has a Bachelor of Science in Biology with an emphasis in Zoology from Southern Utah University. He has more than 11 years of experience with the BLM and is currently a GIS Specialist in the Kanab Field Office.

Evan Glenn – Recreational Use and Visitor Services. Evan has master's degrees in Recreation Planning and Natural Resource Sociology. He has more than 20 years of experience of federal service in recreation management and is currently a Recreation Program State Lead in the BLM Utah State Office.

Environmental Management Planning and Solutions Inc. (EMPSi)

Luke Hodges – Project Manager; Wildlife; Threatened and Endangered Species. Luke has a Bachelor of Science in Biology from Radford University. He has more than 13 years of experience as an environmental professional and is currently a Biologist and Project Manager for EMPSi.

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James Hereford – Assistant Project Manager. James has a Bachelor of Science in Environmental Studies and a Master of Science in Environmental Science with an emphasis in fluvial dynamics from the University of Utah. He has over 22 years of experience as an environmental professional and is currently a NEPA Planner and Environmental Scientist for EMPSi.

Bronson Pace – Project Coordinator. Bronson has a Bachelor of Science in History with a minor in Zoology from Weber State University, a Juris Doctor degree in Natural Resources and Environmental Law from the University of Idaho, and a PhD in Water Resources: Law, Management, and Policy from the University of Idaho. He has over 5 years of NEPA experience and is currently an Environmental Planner for EMPSi.

Holly Prohaska – Senior NEPA Adviser/Quality Assurance Specialist. Holly has a Bachelor of Arts in Marine Science and Biology from the University of San Diego and a Master of Science in Environmental Management from the University of San Francisco. She has over 25 years of BLM NEPA and planning experience and is currently an Environmental Scientist and Project Manager for EMPSi.

Meredith Linhoff – Natural Resources Team Lead. Meredith has a Bachelor of Science in Biology and Environmental Science from SUNY Binghamton and a Master of Arts in Biology from Boston University. She has 22 years of experience as an environmental professional and is currently a NEPA Project Manager for EMPSi.

Angie Adams – Resource Use and Special Designations Team Lead. Angie has a Bachelor of Arts in Biology with a minor in English from Drake University. She has more than 26 years of experience as an environmental professional and is currently a Senior Environmental Planner for EMPSi.

Zoe Ghali – Community Outreach Adviser; Socioeconomics and Environmental Justice Lead. Zoe has a Bachelor of Science in Biology with a minor in Anthropology from the University of California, Santa Barbara; an Interdisciplinary Graduate Certificate in Environmental Policy from the University of Colorado, Boulder; and a Master of Science in Integrative Physiology from the University of Colorado, Boulder. She has more than 16 years of experience as an environmental professional and is currently an Environmental Planner and Scientist for EMPSi.

Alli Yamnitsky – Public Involvement (including MAC assistance); Wild and Scenic Rivers; Areas of Critical Environmental Concern; Old Spanish National Historic Trail; Wilderness Study Areas; Scenic Byways. Alli has a Bachelor of Science in Physical Geography with minors in Environmental Studies and GIS from Western Oregon University. She has over 5 years of experience as an environmental professional and is currently an Environmental Planner for EMPSi.

Clayton McGee – Comment Analysis. Clayton has a Bachelor of Arts in Environmental Studies with a minor in Business and Political Science from the University of Colorado, Boulder. He has more than 3 years of experience as an environmental professional and is currently an Environmental Planner for EMPSi.

Liza Schill – Project Record. Liza has a Bachelor of Science in Forestry with a concentration in Forest Management and a minor in Rangeland Ecology from Colorado State University. She has over 1 year of experience as an environmental professional and is currently an Environmental Planner for EMPSi.

Amy Cordle – Air Quality and Climate. Amy has a Bachelor of Science in Civil Engineering from the Virginia Polytechnic Institute and State University. She has over 26 years of experience as an environmental professional and is currently an Environmental Engineer for EMPSi.

Shine Roshan – Air Quality and Climate. Shine has a Bachelor of Science in Physics with a concentration in Astrophysics and a Master of Science in Physics from San Francisco State University. She has 5 years of experience as an environmental professional and is currently a Senior Environmental Planner for EMPSi.

Erin Hudson – Cultural Resource Management; Native American Religious Concerns and Tribal Use; History, Historic Resources, and Sense of Place. Erin has a Bachelor of Arts in Anthropology from the University of Colorado, Boulder; a Master of Arts in Anthropology from Georgia State University and the University of New Mexico; and a PhD in Anthropology from the University of New Mexico. She has over

15 years of experience as an environmental professional and is currently a Senior Environmental Planner and Cultural Resource Specialist for EMPSi.

Camila Reiswig – Environmental Justice; Social and Economic Values. Camila has a Bachelor of Arts in Economics from Portland State University and a Master of Science in Agriculture and Applied Economics from the University of Illinois, Urbana-Champaign. She has over 6 years of experience as an environmental professional and is currently an Environmental Planner for EMPSi.

Shannon Regan – Noxious Weeds and Invasive, Nonnative Plants; Vegetation Resilience and Conservation. Shannon has a Bachelor of Science in Marine Science from Coastal Carolina University and a Master of Science in Fisheries, Wildlife, and Conservation Biology, with a minor in GIS from North Carolina State University. She has over 8 years of experience as an environmental professional and is currently a Biologist for EMPSi.

Morgan Trieger – Noxious Weeds and Invasive, Nonnative Plants; Fire and Fuels. Morgan has a Bachelor of Science in Conservation and Resource Studies with a minor in Forestry from the University of California, Berkeley. He has over 17 years of experience as an environmental professional and is currently an Environmental Planner for EMPSi.

Andy Spellmeyer – Rangeland Health and Livestock Grazing Management. Andy has a Bachelor of Science in Biology and a Master of Science in Biology from Wichita State University. He has over 6 years of experience as an environmental professional and is currently a Biologist and Environmental Planner for EMPSi.

Derek Holmgren – Recreation Use and Visitor Services; Travel, Transportation, and Access Management. Derek has a Bachelor of Arts in International Studies, with a minor in Spanish from Oregon State University, a Bachelor of Science in Environmental Science from Oregon State University, a Master of Public Administration in Environmental Policy and Natural Resources Management from Indiana University, and a Master of Science in Environmental Science from Indiana University. He has over 20 years of experience as an environmental professional and is currently an Environmental Planner and Scientist for EMPSi.

Noelle Crowley – Recreation Use and Visitor Services; Travel, Transportation, and Access Management. Noelle has a Bachelor of Science in Environmental Studies from the University of Southern California and a Masters of the Environment in Sustainability Planning and Management from the University of Colorado, Boulder. She has over 3 years of experience as an environmental professional and is currently an Environmental Planner for EMPSi.

Amy Lewis – Wild and Scenic Rivers; Areas of Critical Environmental Concern; Old Spanish National Historic Trail; Wilderness Study Areas; Scenic Byways. Amy has a Bachelor of Science in Forestry from the University of Massachusetts, Amherst, and a Master of Science in Environmental Science from Alaska Pacific University. She has over 21 years of experience as an environmental professional and is currently a Senior Environmental Planner and Project Manager for EMPSi.

Emma Davis – Lands with Wilderness Characteristics. Emma has a Bachelor of Science in Geography, with a minor in Renewable Energy from the University of Nevada, Reno. She has over 2 years of experience as an environmental professional and is currently an Environmental Planner and GIS Specialist for EMPSi.

Jenna Jonker – GIS. Jenna has a Bachelor of Arts in Geography, with a minor in Geology from Calvin University. She has over 12 years of experience as an environmental professional and is currently a GIS specialist for EMPSi.

Marcia Rickey – GIS. Marcia has a Bachelor of Science in Biology from the University of Dayton and a Master of Science in Biology, Conservation Biology Sequence, from Illinois State University. She has over 20 years of experience as an environmental professional and is currently a GIS specialist for EMPSi.

Rob Lavie – GIS. Rob has a Bachelor of Arts in Anthropology with a minor in Business Administration from the University of Colorado, Boulder; a Graduate GIS certificate from the University of Colorado, Denver; and a Master of Arts in Applied Geography and Geospatial Science from the University of Colorado, Denver. He has over 5 years of experience as an environmental professional and is currently a GIS specialist for EMPSi.

SWCA Environmental Consultants

Matt Westover – Project Manager; Lands and Realty. Matt has a Master of Science in Wildlife and Wildlands Conservation. He has 10 years of experience as an environmental professional and is currently a Lands and Realty Lead and Project Manager for SWCA.

Arianna Disser – Hydrology (groundwater, surface water, wetlands, riparian areas, floodplains, and water quality); Soils and Biological Soils Crusts. Arianna has a Bachelor of Science in Environmental Science and 5 years of experience as an environmental professional and is currently a Soil and Water Resources Specialist for SWCA.

Victoria Edwards – Lands and Realty. Victoria has a Bachelor of Science in Environmental Science. She has 2 years of experience as an environmental professional and is currently a Lands and Realty Specialist for SWCA.

Chris Bockey – Landscape Characteristics, including Visual Resources, Scenery, Dark Night Skies, and Natural Soundscapes; Scenic Routes. Chris has a Bachelor of Science in Landscape Architecture. He has 13 years of experience as an environmental professional and is currently a Visual Resources, Night Skies, and Natural Soundscapes Lead for SWCA.

Kevin Rauhe – Landscape Characteristics, including Visual Resources, Scenery, Dark Night Skies, and Natural Soundscapes; Scenic Routes. Kevin has a Biologics License Applications in Landscape Architecture. He has 9 years of experience as an environmental professional and is currently a Visual Resources, Night Skies, and Natural Soundscapes Specialist for SWCA.

Vicki Meyers – Paleontological Resources and Geology; Science. Vicki has a Master of Science in Geoscience with an emphasis in Paleontology. She has 19 years of experience as an environmental professional and is currently a Paleontology and Geology Specialist for SWCA.

Mandy Bengtson – Soils and Biological Soils Crusts. Mandy has a PhD in Geoscience with an emphasis in Soil Science. She has 17 years of experience as an environmental professional and is currently a Soil and Water Resources Lead for SWCA.

Gretchen Semerad – Forestry and Woodlands. Gretchen has a Master of Science in Environmental Science. She has 19 years of experience as an environmental professional and is currently a Forestry and Woodland Products Lead for SWCA.

4.6 REFERENCES

BLM (United States Department of the Interior, Bureau of Land Management). 2012. The National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. Internet website: <https://www.blm.gov/sites/blm.gov/files/National%20Programmatic%20Agreement.pdf>.

Glossary

Acquisition: The BLM acquires land, easements, and other real property rights when it is in the public interest and consistent with approved land use plans. The BLM's land acquisition program is designed to (1) improve management of natural resources through consolidation of federal, state, and private lands; (2) increase recreational opportunities, preserve open space, and/or ensure accessibility of public lands; (3) secure key property necessary to protect habitat for threatened and endangered species, promote high-quality riparian areas, and promote biological diversity; (4) preserve archaeological and historical resources; and (5) implement specific acquisitions authorized by Acts of Congress.

Activity Plan: A type of implementation plan (see *Implementation Plan*); an activity plan usually describes multiple projects and applies best management practices to meet land use plan objectives. Examples of activity plans include interdisciplinary management plans, habitat management plans, recreation area management plans, and allotment management plans (from H-1601-I, BLM Land Use Planning Handbook).

Actual Use: Where, how many, what kind or class of livestock, and how long livestock graze on an allotment, or on a portion or pasture of an allotment (from 43 Code of Federal Regulations [CFR] 4100.0-5).

Air Pollution: The addition of any material to the atmosphere that may have a deleterious effect on life on earth.

Air Quality: A measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

Air Quality Class I And II Areas: Regions in attainment areas where maintenance of existing good air quality is of high priority. Class I areas are those that have the most stringent degree of protection from future degradation of air quality. Class II areas permit moderate deterioration of existing air quality.

Air Quality Maintenance Area: A geographic area that had a history of nonattainment but is now consistently meeting the National Ambient Air Quality Standards. Maintenance areas have been redesignated by the U.S. Environmental Protection Agency from “nonattainment” to “attainment with a maintenance plan,” or designated by the Environmental Quality Commission.

Air Quality-Related Values: Resources such as visibility, water, soils, flora, fauna, cultural resources, or odor that have the potential to be changed by air pollution.

Air Quality Standard: Level of air pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.

All-Terrain Vehicle (ATV): A wheeled or tracked vehicle, other than a snowmobile or work vehicle, designed primarily for recreational use or for the transportation of property or equipment exclusively on undeveloped roads, trails, marshland, open country, or other unprepared surfaces (from BLM National Management Strategy for OHV Use on Public Lands).

Allocation: Process to specifically assign use between and ration among competing users for a particular area of BLM-managed land or related waters.

Allotment: An area of land designated and managed for grazing of livestock (43 CFR 4100.0-5).

Allotment Management Plan: A documented program developed as an activity plan, consistent with the definition at 43 United States Code 1702(k), that focuses on, and contains the necessary instructions for, the management of livestock grazing on specified BLM-managed lands to meet resource condition, sustained yield, multiple use, economic, and other objectives (from 43 CFR 4100.0-5).

Alternative: One of at least two proposed means of accomplishing planning objectives.

Ambient (air): The surrounding atmospheric conditions to which the general public has access.

Ambient Air Quality: The state of the atmosphere at ground level as defined by the range of measured or predicted ambient concentrations of all significant pollutants for all averaging periods of interest.

Analysis area: Any lands, regardless of jurisdiction, that the BLM uses to analyze impacts on a particular resource.

Analysis of The Management Situation (AMS): Assessment of the current management direction. It includes a consolidation of existing data needed to analyze and resolve identified issues, a description of current BLM management guidance, and a discussion of existing problems and opportunities for solving them.

Animal Unit Month (AUM): The amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month (from 43 CFR 4100.0-5).

Aquatic: Living or growing in or on the water.

Aquifer: Stratum or zone below the surface of the Earth capable of producing water, as from a well. A saturated bed, formation, or group of formations that yield water in sufficient quantity to be of consequence as a source of supply. An aquifer acts as a transmission conduit and storage reservoir.

Archaeology: The scientific study of the life and culture of past, especially ancient peoples, as by excavation of ancient cities, relics, artifacts, etc.

Archaeological Site: A location that contains material remains of past human activities, generally defined as over 50 years old.

Artifact: A human-modified object, often appearing on an archaeological site, that typically dates to over 50 years in age.

Area of Critical Environmental Concern (ACEC): Area within the BLM-managed lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and

safety from natural hazards (from the Federal Land Policy and Management Act of 1976, Title 43 Chapter 35 Subchapter I 1702(a)).

Arroyo: A small, deep, flat-floored channel or gully of an ephemeral or intermittent stream, usually with nearly vertical banks cut into unconsolidated material. A term commonly used in the arid and semiarid regions of the southwestern United States.

Astrotourism: A type of tourism focused on the viewing of celestial objects, space, and the physical universe within areas of dark night skies where the influence of light pollution is limited.

Attainment area: An area that meets a federal primary or secondary ambient air quality standard for a specified pollutant.

Authorized Officer: The federal employee who has the delegated authority to make a specific decision.

Avoidance Area (Right-of-Way): Areas with sensitive resource values where rights-of-way and Section 302 permits, leases, and easements would be strongly discouraged. Authorizations made in avoidance areas would have to be compatible with the purpose for which the area was designated and not be otherwise feasible on lands outside the avoidance area.

Back Country Byways: Vehicle routes that traverse scenic corridors utilizing secondary or backcountry road systems. National Back Country Byways are designated by the type of road and vehicle needed to travel the byway.

Best Management Practice (BMP): A technique that guides, or may be applied to, management actions to aid in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a land use plan decision unless the land use plan specifies that they are mandatory. They may be updated or modified without a plan amendment if they are not mandatory (from H-1601-I, BLM Land Use Planning Handbook).

Big Game: Indigenous ungulate wildlife species that are hunted, such as elk, deer, bison, bighorn sheep, and pronghorn.

Biodiversity: The variety of life and its processes, and the interrelationships within and among various levels of ecological organization. Conservation, protection, and restoration of biological species and genetic diversity are needed to sustain the health of existing biological systems. Federal resource management agencies must examine the implications of management actions and development decisions on regional and local biodiversity.

Biological Soil Crust or Cryptobiotic Crust: Biological communities that form a surface layer or crust on some soils. These communities consist of cyanobacteria (blue-green bacteria), micro fungi, mosses, lichens, and green algae and perform many important functions, including fixing nitrogen and carbon, maintaining soil surface stability, and preventing erosion. Cryptobiotic crusts also influence the nutrient levels of soils and the status and germination of plants in the desert. These crusts are slow to recover after severe disturbance.

Bortle Scale: A nine-level numeric scale that measures the night sky's and stars' brightness at a particular location. Lower Bortle Classes correspond with pristine, dark night skies.

Boundary: 1. Every natural and/or artificial demarcation of the bounds or territorial extent of a federal interest asset. 2. Limits or marks of enclosures if possession is not based upon written title, or the boundaries or limits.

Boundary Evidence Risk Assessment: A determination if the boundary evidence to the land or interest in the subject land is sufficient for the intended purpose.

Boundary Sign: Any BLM sign indicating or stating that it marks the boundary of: 1) a property line between the BLM and an adjacent landowner, or 2) an administrative line between federal interest land and withdrawn land must be placed within 1 foot of the true boundary.

C4 Plant: Fixes carbon dioxide into a molecule containing four carbon atoms before initiating the Calvin-Benson cycle of photosynthesis.

Candidate Species: Taxa for which the U.S. Fish and Wildlife Service has sufficient information on their status and threats to support proposing the species for listing as endangered or threatened under the Endangered Species Act but for which issuance of a proposed rule is currently precluded by higher-priority listing actions. Separate lists for plants, vertebrate animals, and invertebrate animals are published periodically in the Federal Register (from BLM Manual 6840, Special Status Species Manual).

Canyoneering: The sport of exploring canyons by climbing, rappelling, rafting, and waterfall jumping.

Carbon Dioxide: A colorless, odorless gas produced by burning carbon and organic compounds and by respiration. It is naturally present in the air (about 0.03 percent) and is absorbed by plants in photosynthesis. Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

Carbon Monoxide: A colorless, odorless, poisonous gas produced by incomplete burning of carbon-based fuels, including gasoline, oil, and wood. Carbon monoxide is also produced from incomplete combustion of many natural and synthetic products.

Casual Collecting: The collecting of a reasonable amount of common invertebrate and plant paleontological resources for noncommercial personal use, either by surface collection or the use of nonpowered hand tools resulting in only negligible disturbance to the Earth's surface and other resources.

Cenomanian-santonian ages: Span of geologic ages including Cenomanian, Turanian, Coniacian, and Santonian during Late Cretaceous time, 98 to 84 million years ago.

Class I Area (for air quality): Certain wilderness areas greater than 5,000 acres, national memorial parks greater than 5,000 acres, national parks greater than 6,000 acres, and international parks that were in existence on or before August 7, 1977.

Class II Area (for air quality): By default, all areas not designated as Class I areas.

Clean Air Act: Federal legislation governing air pollution. The Clean Air Act established National Ambient Air Quality Standards for carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead. Prevention of significant deterioration classifications define the allowable increased levels of air quality deterioration above legally established levels. They include the following:

- Class I: Minimal additional deterioration in air quality (certain national parks and wilderness areas)
- Class II: Moderate additional deterioration in air quality (most lands)
- Class III: Greater deterioration for planned maximum growth (industrial areas)

Climate Change: Any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from the following:

- Natural factors, such as changes in the sun's intensity or slow changes in the earth's orbit around the sun
- Natural processes within the climate system (for example, changes in ocean circulation)
- Human activities that change the atmosphere's composition (for example, driving motor vehicles) and the land surface (for example, deforestation, reforestation, urbanization, and desertification)

Closed: Generally, denotes that an area is not available for a particular use or uses; refer to specific definitions found in law, regulations, or policy guidance for application to individual programs. For example, 43 CFR 8340.0-5 sets forth the specific meaning of "closed" as it relates to off-highway vehicle use, and 43 CFR 8364 defines "closed" as it relates to closure and restriction orders (from H-1601-1, BLM Land Use Planning Handbook).

Corridor: A wide strip of land within which a proposed linear facility could be located.

Critical Habitat: (1) The specific areas within the geographical area currently occupied by a species, at the time it is listed in accordance with the Endangered Species Act, on which are found those physical or biological features (i) essential to the conservation of the species and (ii) that may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by a species at the time it is listed upon determination by the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service that such areas are essential for the conservation of the species. Critical habitats are designated in 50 CFR Parts 17 and 226. The constituent elements of critical habitat are those physical and biological features of designated or proposed critical habitat essential to the conservation of the species (from BLM Manual 6840, Special Status Species Manual).

Criteria Air Pollutant: Pollutants known to be hazardous to human health and the public welfare. The Clean Air Act required the U.S. Environmental Protection Agency to set National Ambient Air Quality Standards for pollutants known to be hazardous to human health and public welfare. Six pollutants were identified: ozone, carbon monoxide, particulate matter (defined as having diameters less than or equal to 10 microns or to 2.5 microns), sulfur dioxide, lead, and nitrogen oxides. The term "criteria pollutant" derives from the requirement that the U.S. Environmental Protection Agency must describe the characteristics and the potential health and welfare effects of these pollutants. It is on the basis of such criteria that the National Ambient Air Quality Standards are set or revised.

Crucial Winter Range: The portion of the winter range to which a wildlife species is confined during periods of heaviest snow cover.

Cryptobiotic Crust: See *Biological Soil Crust*.

Cryptogam: A plant that bears no flowers or seeds but propagates by means of spores. Cryptogamic organisms make up a cryptogamic crust or surface on certain soils.

Cultural Resource or Cultural Property: A definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups (cf. “traditional cultural property;” see *Definite Location*). Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing for public benefit described in BLM Manual 8100 series. They may be but are not necessarily eligible for the National Register of Historic Places (see *Historic Property*).

Cultural Resource Inventory Classes: (See BLM Manual Section 8110.21.)

- Class I: Existing information inventory. A study of published and unpublished documents, records, files, registers, and other sources resulting in analysis and synthesis of all reasonably available data. Class I inventories encompass prehistoric, historic, and ethnological/sociological elements, and are in large part chronicles of past land uses. They may have major relevance to current land use decisions.
- Class II: Probabilistic field survey. A statistically based sample survey designed to help characterize the probable density, diversity, and distribution of archaeological properties in a large area by interpreting the results of surveying limited and discontinuous portions of the target area (cf. “reconnaissance survey”).
- Class III: Intensive field survey. A continuous, intensive survey of an entire target area, aimed at locating and recording all archaeological properties that have surface indications, by walking close-interval parallel transects until the area has been thoroughly examined. Class III methods vary geographically, conforming to the prevailing standards for the region involved (from BLM Manual 8100, BLM Cultural Resources Management).

Cultural Resource Project Plan: A detailed design plan for implementing decisions made in regional or local land use plans. Cultural resource project plans include precise estimates of workforce, time/scheduling, equipment, and supply needs for specific management or information gathering action. They should be sufficiently detailed to serve as contract specifications, as needed, and to provide a direct link between planning and budgeting.

Cumulative Effect: The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (from H-1790-I, BLM National Environmental Policy Act Handbook).

Decision Area: The lands within the Planning Area for which the BLM has authority to make management decisions.

Departed Watershed: Watersheds with a high degree of departure from reference conditions identified by BLM Utah State Office relating to water, soil, and vegetation resources. For more information about analysis, see **Appendix B**.

Designated Roads and Trails: Specific roads and trails identified by the BLM (or other agencies) where some type of motorized vehicle use is appropriate and allowed either seasonally or year-long (from H-1601-I, BLM Land Use Planning Handbook).

Desired Plant Communities: An identified species composition that is most compatible with management objectives for a site including the desired mix of vegetative types, structural stages, and landscape and riparian functions.

Dirt Bike: Non-street-legal motorcycle.

Discretionary Action: Actions or activities that must be approved or authorized by the BLM Authorized Officer in which the BLM Authorized Officer has a choice about whether or how to approve or implement the action or activity.

Dispersed or Extensive Recreation: Recreation activities of an unstructured type that are not confined to specific locations or dependent on recreation sites. Examples of these activities may be hunting, fishing, off-road vehicle use, hiking, and sightseeing.

Disposal: Transfer of BLM-managed land out of federal ownership to another party through sale, exchange, Recreation and Public Purposes Act, Desert Land Entry, or other land law statutes.

Distance Zones: A subdivision of the landscape as viewed from an observer position. The subdivision (zones) includes foreground-middle ground, background, and seldom seen.

Easement: An interest in land entitling the owner or holder, as a matter of right, to enter upon land owned by another party for a particular purpose.

Ecological Site Description: Description of the soils, uses, and potential of a kind of land with specific physical characteristics to produce distinctive kinds and amounts of vegetation.

Ecological Site Group (ESG): Generalized groupings of U.S. Department of Agriculture, Natural Resources Conservation Service ecological sites based on climate, soil, and geomorphic properties (Nauman et al. 2022¹). Ecological site groups incorporate additional context and information about how landscapes may respond to management.

Ecological Site Inventory: The basic inventory of present and potential vegetation on BLM rangelands. Ecological sites are differentiated on the basis of significant differences in kind, proportion, or amount of

¹ Nauman, T. W., S. S. Burch, J. T. Humphries, A. C. Knight, and M. C. Duniway. 2022. "A Quantitative Soil-Geomorphic Framework for Developing and Mapping Ecological Site Groups." *Rangeland Ecology and Management* 81:9–33.

plant species in the plant community. Ecological site inventory uses soils, the existing plant community, and ecological site data to determine the appropriate ecological site for a specific area of rangeland and to assign the appropriate ecological status.

Ecosystem: A system made up of a community of animals, plants, and bacteria and its interrelated physical and chemical environment.

Eligibility: Qualification of a river for inclusion into the National Wild and Scenic Rivers System through the determination (professional judgment) that it is free-flowing and, with its adjacent land area, possesses at least one river-related value considered to be outstandingly remarkable (from BLM Manual 8351, BLM Wild and Scenic Rivers Policy and Program).

Eligible River Segment: A section of a river that qualifies for inclusion into the National Wild and Scenic Rivers System through determination that it is free-flowing and with its adjacent land area possessing at least one river-related value considered to be outstandingly remarkable.

Emergency Stabilization and Rehabilitation: Actions to stabilize and prevent unacceptable degradation to land or resources, to minimize threats to life or property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources.

Endangered Species: Any animal or plant species in danger of extinction throughout all or a significant portion of its range. These species are listed by the U.S. Fish and Wildlife Service (from BLM Manual 6840, Special Status Species Manual).

Enhance: To increase or improve in value, quality, desirability, or attractiveness.

Environmental Impact Statement (EIS): A detailed statement prepared by the responsible official in which a major Federal action that would significantly affect the quality of the human environment is described, alternatives to the proposed action provided, and effects analyzed (from BLM National Management Strategy for OHV Use on Public Lands).

Ephemeral Stream: A stream that flows only in direct response to precipitation, and whose channel is at all times above the water table. Ephemeral streams generally do not flow continuously for more than 30 days and generally have more robust upland vegetation than found outside of the ephemeral riparian-wetland area.²

Equestrian: Of horses, horsemen, or horseback riding.

Exclusion Area (for Rights-of-Way): Areas which are not available for location of rights-of-way under any condition (from H-1601-1, BLM Land Use Planning Handbook).

² United States Department of the Interior. 1998. Riparian Area Management: A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15. Bureau of Land Management, Forest Service, Natural Resources Conservation Service. Written by: Prichard, D., J. Anderson, C. Correll, J. Fogg, K. Gebhardt, R. Krapf, S. Leonard, B. Mitchell, and J. Staats. Denver: CO. BLM/RS/ST-98/001+1737. 127 pp.

Extensive Recreation Management Area (ERMA): A BLM-managed lands unit identified in land use plans containing all acreage not identified as a Special Recreation Management Area. Recreation management actions within an ERMA are limited to only those of a custodial nature.

Facies: A lateral or vertical variation in the lithologic or palaeontologic characteristics of a geologic formation that differs as a group from that elsewhere in the same formation. It is caused by or reflects a change in the depositional environments.³

Facilities: Facilities include such things as visitor centers, routes, trails, outhouses, and parking lot facilities do not include signs.

Fauna: The animals of a specified region or time.

Federal Land Policy and Management Act of 1976 (FLPMA): Public Law 94-579 (October 21, 1976), often referred to as the BLM's "Organic Act," which provides the majority of the BLM's legislated authority, direction, policy, and basic management guidance.

Federal Lands: As used in this document, lands owned by the United States, without reference to how the lands were acquired or what Federal agency administers the lands. The term includes mineral estates or coal estates underlying private surface but excludes lands held by the United States in trust for Indians, Aleuts, or Eskimos (see also *Public Land*).

Federal Protection Component (in relation to National Historic Trails): Segments of a trail that afford high-quality recreation experiences along a portion of the route having greater-than-average scenic values or affording an opportunity to share vicariously the experience of the original users of a historic route.

Fire Management Plan (FMP): A strategic implementation-level plan that defines a program to manage wildland fire, fuel reduction, and fire rehabilitation based on an area's approved Resource Management Plan. FMPs must address a full range of fire management activities that support ecosystem sustainability, values to be protected, protection of firefighter and public safety, public health, and environmental issues. They must be consistent with resource management objectives and activities of the area.

Fire Regime Group: A classification of fire regimes into a discrete number of categories based on frequency and severity. The national, coarse-scale classification of fire regime groups commonly used includes five groups: I - frequent (0-35 years), low severity; II - frequent (0-35 years), stand replacement severity; III - 35-100+ years, mixed severity; IV - 35-100+ years, stand replacement severity; and V - 200+ years, stand replacement severity.

Floodplain: A plain along a river, formed from sediment deposited by floods.

Flora: The plants of a specified region or time.

³ Stokes, W. L. 1986. *Geology of Utah*. Utah Museum of Natural History, University of Utah and Utah Geological and Mineral Survey, Department of Natural Resources, State of Utah. Salt Lake City, Utah; Skinner, B. J., and S. C. Porter. 1992. *The Dynamic Earth: An Introduction to Physical Geology*. John Wiley and Sons, Inc. New York: New York.

Forage: Vegetation of all forms available and of a type used for animal consumption.

Fossil: Any remains, traces, or imprints of prehistoric non-human organisms preserved in or on the Earth's crust that provide information about the history of life on Earth.

Four-Wheel-Drive (4wd): Four-wheel-drive, differential transfer case disperses 50/50 front and rear displacement. Trucks, cars, buses, or sport utility vehicles with high clearance and the ability to operate off pavement as well as on highways.

Functioning At Risk (FAR): (1) Condition in which vegetation and soil are susceptible to losing their ability to sustain naturally functioning biotic communities. Human activities, past or present, may increase the risks. (2) Uplands or riparian-wetland areas that are properly functioning, but a soil, water, or vegetation attribute makes them susceptible to degradation and lessens their ability to sustain natural biotic communities. Uplands are particularly at risk if their soils are susceptible to degradation. Human activities, past or present, may increase the risks. See also *Properly Functioning Condition* (from H-4180-1, BLM Rangeland Health Standards Manual).

Fugitive Dust: Airborne particles emitted from any source other than through a stack or vent.

Geographic Information System (GIS): A system of computer hardware, software, data, people, and applications that capture, store, edit, analyze, and graphically display a potentially wide array of geospatial information (from H-1601-1, BLM Land Use Planning Handbook).

Geology: The science that studies the Earth, the rocks of which it is composed, and the changes it has undergone or is undergoing.

Goal: A broad statement of a desired outcome; usually not quantifiable and may not have established times for achievement (from H-1601-1, BLM Land Use Planning Handbook).

Grazing Allotment Categories: Direction under which all grazing allotments are categorized for management purposes into three groups. The overall objectives are: M, maintain the current resource conditions; I, improve the current resource conditions; and C, custodial manage the existing resource values.

Grazing Permit: A document authorizing use of the BLM-managed lands within an established grazing district. Grazing permits specify all authorized use including livestock grazing and suspended use. Permits specify the total number of animal unit months apportioned, the area authorized for grazing use, or both (from 43 CFR 4100.0-5).

Grazing Preference or Preference: A superior or priority position against others for the purpose of receiving a grazing permit or lease. This priority is attached to base property owned or controlled by the permittee or lessee (from 43 CFR 4100.0-5).

Greenhouse Gas (GHG): A gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary GHGs in the earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

Guideline: A practice, method, or technique determined to be appropriate to ensure that standards can be met or that significant progress can be made toward meeting the standard. Guidelines are tools such as grazing systems, vegetative treatments, or improvement projects that help managers and permittees achieve standards. Guidelines may be adapted or modified when monitoring or other information indicates the guideline is not effective, or a better means of achieving the applicable standard becomes appropriate (from H-4180-I, BLM Rangeland Health Standards Manual).

Habitat Management Plan (HMP): An officially approved activity plan for a specific geographic area of BLM-managed land. An HMP identifies wildlife habitat and related objectives, defines the sequence of actions to be implemented to achieve the objectives, and outlines procedures for evaluating accomplishments.

Hanging Garden: Small pockets of vegetative associations surrounding canyon-wall springs that often contain a wide variety of unique plant and insect species. Hanging gardens are characteristic of flat-lying strata with deeply incised canyons of the Colorado Plateau.

Hazardous Air Pollutant: Pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.

Historic Property: Cultural resources, such as historic buildings, structures, objects, districts, or archaeological sites, that are listed on, or eligible for listing on, the National Register of Historic Places.

Hydrology: The science dealing with the properties, distribution, and circulation of water.

Hydrologic Unit: A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream, or similar surface waters. HUC is the acronym for Hydrologic Unit Code. Every hydrologic unit is identified by a unique HUC consisting of 2 to 12 digits based on the levels of classification in the hydrologic unit system.

Hydrological Function: Soil, stream, wetland and riparian area properties related to the storage, timing, distribution, and circulation of water.

Impacts (or Effects): Changes to the human environment from the proposed action that are reasonably foreseeable. Effects analysis predicts the degree to which the environment would be affected by an action. The Council on Environmental Quality uses both the terms “effect” and “impact” in the National Environmental Policy Act regulations; these terms are synonymous in the National Environmental Policy Act context. As a noun, other synonyms include consequence, result, and outcome. Effects can be both beneficial and detrimental.

Implementation Decisions: Decisions that take action to implement land use plan decisions; generally appealable to the Interior Board of Land Appeals under 43 CFR 4.410 (from H-1601-I, BLM Land Use Planning Handbook).

Implementation Plan: A sub-geographic or site-specific plan written to implement decisions made in a land use plan. Implementation plans include both activity plans and project plans (they are types of implementation plans) (from H-1601-I, BLM Land Use Planning Handbook).

Indian Tribe (or Tribe): Any Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994 (from BLM Handbook H-1780-I, part G2).

Indicators: Components of a system whose characteristics (presence or absence, quantity, distribution) are used as an index of an attribute (such as rangeland health attribute) that are too difficult, inconvenient, or expensive to measure (Interagency Technical Reference 1734-8, 2000) (from H-4180-I, BLM Rangeland Health Standards Manual).

Indirect Economic Impacts: Impacts in the industries that supply or interact with the primary industries. For example, when a restaurant expands and purchases new materials, the industry sectors supplying the materials experience indirect impacts.

Induced Economic Impacts: Impacts that represent increased spending by workers who earn money due to increased economic activity, such as when restaurant employees use their wages to purchase goods from local shops.

Inholding: A nonfederal parcel of land within the designated area boundary perimeter line that would become part of the designated area should it be acquired.

Instant Study Area (ISA): A designation of all primitive or natural areas formally identified prior to November 1, 1975, that were to be studied for wilderness suitability and recommended to the President by July 1, 1980, as mandated under Section 603 of the Federal Land Policy and Management Act.

Intermittent or Seasonal Stream: A stream that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas. Generally, intermittent streams flow continuously for periods of at least 30 days and usually have visible vegetation or physical characteristics reflective of permanent water influences, such as the presence of cottonwoods.⁴

Invasive Plant: Plants that are not native and cause or are likely to cause harm to ecology, the economy, or human health (Executive Orders 13112 and 13751).

Invertebrate Species: Any animal without a backbone or spinal column.

Kind or Class of Livestock:

- **Kind:** The species of domestic livestock-cattle and sheep
- **Class:** The age class (that is, yearling or cows) of a species of livestock

Known Geologic Structures: Technically, the known geologic structure of a producing oil or gas field is construed by the U.S. Geological Survey to be the trap, whether structural or stratigraphic, in which an

⁴ United States Department of the Interior. 1998. Riparian Area Management: A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15. Bureau of Land Management, Forest Service, Natural Resources Conservation Service. Written by: Prichard, D., J. Anderson, C. Correll, J. Fogg, K. Gebhardt, R. Krapf, S. Leonard, B. Mitchell, and J. Staats. Denver: CO. BLM/RS/ST-98/001+1737. 127 pp.

accumulation of oil or gas has taken place, and the limits of said trap, irrespective of the degree to which it may be occupied by oil or gas. Known geologic structures are frequently much more extensive than the pools of oil or gas they may contain, and the extent and place of any oil or gas accumulation therein, though influenced by structure, is finally determined by such factors as stratigraphy, hydrocarbon supply, sand conditions, and hydrostatic pressure. The U.S. Geological Survey seeks to evaluate the net effect of these several factors in terms of reasonably presumptive productive acreage and, as far as practicable, to conform the results, modified to include a fair safety margin, to the subsurface contours of the dominant structural feature involved.

L50 (dba): A descriptor of loudness, which represents the existing ambient noise levels where the sound level is exceeded 50 percent of the time.

L90 (dba): A descriptor of loudness, which represents the existing ambient noise levels where the sound level is exceeded 90 percent of the time.

Landfire: Program that provides over 25 national geo-spatial layers (such as vegetation, fuel, and disturbance), databases, and ecological models.

Land Tenure Adjustments: Ownership or jurisdictional changes are referred to as “Land Tenure Adjustments.” To improve the manageability of BLM-managed surface land and improve their usefulness to the public, the BLM has numerous authorities for “repositioning” lands into a more consolidated pattern, disposing of lands, acquiring lands, and entering into cooperative management agreements. These land pattern improvements are completed primarily through the use of land exchanges, but also through land sales, land acquisitions, jurisdictional transfers to other agencies, and use of cooperative management agreements and leases.

Land Use Allocation: The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the Decision Area, based on desired future conditions (from H-1601-I, BLM Land Use Planning Handbook).

Land Use Plan (LUP): A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of the Federal Land Policy and Management Act; an assimilation of LUP-level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed. The term includes both Resource Management Plans and Management Framework Plans (from H-1601-I, BLM Land Use Planning Handbook).

Land Use Plan Amendment: The process for considering or making changes in the terms, conditions, and decisions of approved Resource Management Plans or Management Framework Plans. Usually only one or two issues are considered that involve only a portion of the Decision Area (from H-1601-I, BLM Land Use Planning Handbook).

Land Use Plan Decision: Establishes desired outcomes and actions needed to achieve them. Decisions are reached using the planning process in 43 CFR 1600. When they are presented to the public as proposed decisions, they can be protested to the BLM Director. They are not appealable to the Interior Board of Land Appeals (from H-1601-I, BLM Land Use Planning Handbook).

Lands Records System: Those records maintained by the BLM, showing rights, title, and interest of the federal land.

Lease: An authorization or contract by which one party conveys the use of property to another party in return for rental payments. Section 302 of the Federal Land Policy and Management Act of 1976 provides the BLM's authority to issue leases for the use, occupancy, and development of public lands. Leases are issued for purposes such as communication sites, parks, and other recreational facilities. The regulations establishing procedures for the processing of these leases are found in 43 CFR 2920 and 2740.

Lek: An assembly area where birds, especially sage-grouse, carry on display and courtship behavior.

Light Pollution: The brightening of the night sky caused by streetlights and other man-made sources.

Limited: An area restricted at certain times, in certain areas, and/or to certain vehicular use. These restrictions may be of any type but can generally be accommodated within the following type of categories: numbers of vehicles; types of vehicles; time or season of vehicle use; permitted or licensed use only; use on existing roads and trails; use on designated roads and trails; and other restrictions (from BLM National Management Strategy for OHV Use on Public Lands).

Maintain: To cause or enable the condition to continue.

Management Decision: A decision made by the BLM to manage BLM-managed lands. Management decisions include both land use plan decisions and implementation decisions (from H-1601-1, BLM Land Use Planning Handbook).

Management-Ignited Fire: Controlled application of fire to natural fuels under conditions of weather, fuel moisture, and soil moisture that will allow confinement of the fire to a predetermined area and, at the same time, will produce the intensity of heat and rate of spread required to accomplish certain planned benefits to one or more objectives to wildlife, livestock, and watershed values. The overall objectives are to employ fire scientifically to realize maximum net benefits at minimum environmental damage and acceptable cost.

Management of Land Boundary Plans: A high-level boundary evidence risk assessment for a special management area, generally focused on high-risk boundaries of high-valued lands or resources; used in outyear Management of Land Boundary budget and workforce planning documents.

Mechanical Transport (mechanized vehicle): Any vehicle, device, or contrivance for moving people or material in or over land, water, snow, ice, or air that has moving parts as essential components of the transport and that has wheels or otherwise applies a mechanical advantage, regardless of power source. Mechanical transport includes, but is not limited to bicycles, game carts, wagons, and wheelbarrows. It does not include devices that may provide mechanical advantage but are not used for transporting material over great distances (such as pulleys, pry bars, or winches), or methods of transport where the mechanical advantage is from non-moving parts (such as travois) or is incidental to primary means of transport (such as ski bindings, horse bits, or oarlocks). Wheelchairs, or other mobility devices that meet the definition of "wheelchair" in the Americans with Disabilities Act, Section 508(c), are not prohibited in Wilderness Study Areas.

Methane: Emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock, other agricultural practices, and land use and by the decay of organic waste in municipal solid waste landfills.

Migratory: A group of people or of birds, fishes, or plants that move from one region to another with the change of seasons or climate.

Minimum Impact Filming: A filming activity that does not involve:

- Impact on sensitive habitat or species
- Impact on Native American Indian sacred rites
- Use of explosives or major use of pyrotechnics
- More than minimum impacts on land, air, or water
- Use of exotic species with danger of introduction into the area
- Adverse impacts on sensitive resources including historic, cultural, or paleontological sites; sensitive soils; relict environments; or wetlands or riparian areas
- Use of heavy equipment
- Use of vehicles off designated routes
- Set construction
- Significant restriction of public access
- Significant use of domestic livestock
- Aircraft taking off, landing, or flying lower than 1,000 feet above the site
- 15 or more production vehicles, or 75 or more people
- In excess of 10 days of production

Mitigation: A method or process by which impacts from actions may be made less injurious to the environment through appropriate protective measures. 40 CFR 1508.20 further defines mitigation as: (1) avoiding the impact altogether by not taking a certain action or parts of an action; (2) minimizing an impact by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance; and/or (5) compensating for the impact by replacing or providing substitute resources or environments.

Mitigation Measures: Constraints, requirements, or conditions imposed to reduce the significance of or eliminate an anticipated impact on environmental, socioeconomic, or other resource values from a proposed land use. Committed mitigation measures are those measures the BLM is committed to enforce (that is, all applicable laws and their implementing regulations).

Monument Management Plan (MMP): A land use plan as prescribed by the Federal Land Policy and Management Act and National Forest Management Act that establishes land use allocations, coordination guidelines for multiple use, objectives, and actions to be achieved for a national monument and given area of land.

Mountain Bicycle: A bicycle designed for off-pavement use that is generally multi-gearred with fat, knobby tires. Frames and tire rims are stronger than those on road bicycles. They are sometimes referred to in this document as a mechanized vehicle.

Multiple Use: The management of the BLM-managed lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific, and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output (from the Federal Land Policy and Management Act, Title 43 Chapter 35 Subchapter I 1702(c)).

National Ambient Air Quality Standards (NAAQS): The allowable concentrations of air pollutants in the air specified by the federal government. The air quality standards are divided into primary standards (based on the air quality criteria and allowing an adequate margin of safety to protect the public health) and secondary standards (based on the air quality criteria and allowing an adequate margin of safety to protect the public welfare) from any unknown or expected adverse effects of air pollutants.

National Register of Historic Places (NRHP): The NRHP, expanded and maintained by the Secretary of the Interior, as authorized by section 2(b) of the Historic Sites Act and section 101(a)(1)(A) of the National Historic Preservation Act. The NRHP lists cultural properties found to qualify for inclusion because of their local, State, or national significance. Eligibility criteria and nomination procedures are found in 36 CFR Part 60. The Secretary's administrative responsibility for the NRHP is delegated to the National Park Service (from Manual 8100, BLM Cultural Resources Management).

National Wild and Scenic Rivers System: A system of nationally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values and are preserved in a free-flowing condition. The system consists of three types of streams: (1) recreation—rivers or sections of rivers that are readily accessible by road or railroad and that may have some development along their shorelines and may have undergone some impoundments or diversion in the past; (2) scenic—rivers or sections of rivers free of impoundments with shorelines or watersheds still largely undeveloped but accessible in places by roads; and (3) wild—rivers or sections of rivers free of impoundments and generally inaccessible except by trails, with watersheds or shorelines essentially primitive and waters unpolluted.

Natural Process: A process existing in or produced by nature (rather than by the intent of human beings).

Naturalized Species: Nonnative species that integrates into a given ecosystem and becomes capable of reproducing.

Naturalness: Lands and resources exhibit a high degree of naturalness when affected primarily by the forces of nature and where the imprint of human activity is substantially unnoticeable. The BLM has authority to inventory, assess, and/or monitor the attributes of the lands and resources on BLM-managed lands, which, taken together, are an indication of an area's naturalness. These attributes may include the presence or absence of roads and trails, fences, and other improvements, the nature and extent of landscape modifications.

Net Loss: When the total amount of losses exceeds the total amount of gains.

Nitrogen Oxides: Produced from burning fuels, including gasoline and coal. Nitrogen oxides are smog formers, which react with volatile organic compounds to form smog. Nitrogen oxides are also major components of acid rain.

Nitrous Oxide: Emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; and wastewater treatment.

Nonattainment Area: An area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) any of the federal primary or secondary ambient air quality standards for the pollutant.

Nonfunctioning: Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows.

Nonmarket benefit: Improvements in societal welfare that are not bought or sold.

Nonmechanized Travel: Moving by foot or by pack or stock animal.

Nonnative Plant: An introduced plant species living outside its native distributional range that has arrived there by human activity, either deliberate or accidental.

Noxious Weed: Designated under federal and state noxious weed acts. Noxious weeds in the planning area are listed under the Utah Noxious Weed Act of 2008. This act defines "noxious weed" as "any plant the commissioner determines to be especially injurious to public health, crops, livestock, land, or other property."

Objective: A description of a desired condition for a resource. Objectives can be quantified and measured and, where possible, have established time frames for achievement (from H-1601-1, BLM Land Use Planning Handbook).

Off-Highway Vehicle (OHV): Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: (1) any non-amphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the BLM Authorized Officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used for national defense (from H-1601-1, BLM Land Use Planning Handbook).

Off-Highway Vehicle Designations:

- **Open:** designated areas where OHVs may be operated.
- **Limited:** designated areas and trails where the use of an OHV is subject to restrictions, such as limiting the dates and times of use (seasonal restrictions); limiting use to designated roads and trails; or limiting use to existing roads and trails. Combinations of restrictions are possible.
- **Closed:** designated areas, roads, and trails where the use of an OHV is permanently or temporarily prohibited. Emergency use of vehicles is allowed.

Official Use: Use by an employee, agent, or designated representative of the federal government or one of its contractors, in the course of his employment, agency, or representation (from BLM National Management Strategy for OHV Use on Public Lands).

Old Growth: Old growth generally encompasses trees that were established prior to European settlement or greater than 150 years old. Characteristics of old growth juniper often include: (1) Rounded or unsymmetrical tops that may be sparse and contain dead limbs, (2) Deeply furrowed, fibrous bark, (3) branches near the base of the tree that may be very large and covered with lichens.

Open: Generally, denotes that an area is available for a particular use or uses. Refer to specific program definitions found in law, regulations, or policy guidance for application to individual programs. For example, 43 CFR 8340.0-5 defines the specific meaning of “open” as it relates to off-highway vehicle use (from H-1601-1, BLM Land Use Planning Handbook).

Outstanding Natural Area (ONA): A 1994 *Federal Register* notice (59 FR 107, 29205-29206) clarified that the regulations under which these areas were classified are no longer relevant. These were established to preserve scenic values and areas of natural wonder. The preservation of these resources in their natural condition was the primary management objective. Access roads, parking areas, and public use facilities were normally located on the periphery of the area. The public was encouraged to walk into the area for recreational purposes wherever feasible.

Outstandingly Remarkable Values: Values among those listed in Section 1(b) of the Wild and Scenic Rivers Act: “scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values.” Other similar values that may be considered include ecological, biological or botanical, paleontological, hydrological, scientific, or research values (from BLM Manual 8351, BLM Wild and Scenic Rivers Policy and Program).

Ozone: A gas that is a variety of oxygen. The oxygen gas found in the air consists of two oxygen atoms stuck together; this is molecular oxygen. Ozone consists of three oxygen atoms stuck together into an ozone molecule. Ozone occurs in nature; it produces the sharp smell near a lightning strike. High concentrations of ozone gas are found in a layer of the atmosphere—the stratosphere—high above the earth. Stratospheric ozone shields the earth against harmful rays from the sun, particularly ultraviolet B. Smog’s main component is ozone; this ground-level ozone is a product of reactions among chemicals produced by burning coal, gasoline, and other fuels, and chemicals found in products, including solvents, paints, and hairsprays.

Paleontological Resource: Any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust, that are of paleontological interest and that provide information about the history of life on Earth.

Paleontology: The scientific study of prehistoric life based on fossil record.

Particulate Matter: Includes dust, soot, and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including burning of diesel fuels by trucks and buses; incineration of garbage; mixing and application of fertilizers and pesticides; road construction; industrial processes, such as steel making, mining operations, agricultural burning (field and slash burning); and operation of fireplaces and woodstoves.

Perennial Stream: A stream that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.

Permit: A short-term, revocable authorization to use BLM-managed lands for specific purposes, Section 302 of the Federal Land Policy and Management Act provides the BLM's authority to issue permits for the use, occupancy, and development of the BLM-managed lands. Permits are issued for purposes such as commercial or noncommercial filming, advertising displays, commercial or noncommercial croplands, apiaries, harvesting of native or introduced species, temporary or permanent facilities for commercial purposes (does not include mining claims), residential occupancy, construction equipment storage sites, assembly yards, oil rig stacking sites, mining claim occupancy if the residential structures are not incidental to the mining operation, and water pipelines and well pumps related to irrigation and nonirrigation facilities. The regulations establishing procedures for the processing of these permits are found in 43 CFR 2920.

Permitted Use: The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease, expressed in animal unit months (43 CFR 4100.0-5) (from H-4180-I, BLM Rangeland Health Standards Manual).

Permittee: (Livestock Operator) A person or organization legally permitted to graze a specific number and class of livestock on designated areas of BLM-managed land during specified seasons each year.

Petrified Wood: Fossilization of wood through introduction or replacement by silica (silicified wood) in such a manner that the original form and structure of the wood is preserved.

Phased Restoration: Any restoration project where multiple steps/phases are used to protect and/or restore natural process and functions.

Physiographic Region: Region of similar geologic structure and climate with a unified history of land formation.

Planning Area: All lands within the boundaries of Grand Staircase-Escalante National Monument, regardless of jurisdiction.

Planning Criteria: Planning criteria guide development, revision, or amendment of the RMP to ensure it is tailored to the issues previously identified and that the BLM avoids unnecessary data collection and

analysis (43 CFR 1610.4-2(a)). Planning criteria provide the framework for the estimation of effects (43 CFR 1610.4-6).

Prescribed Fire: Any fire ignited by management action to meet specific objectives. A written, approved prescribed fire plan must exist, and National Environmental Policy Act requirements must be met, prior to ignition (from H-9214-1, BLM Prescribed Fire Management Handbook).

Prey Species: An animal taken by a predator as food.

Primitive and Unconfined Recreation: Visitors may have opportunities for primitive and unconfined types of recreation when the sights, sounds, and evidence of other people are rare or infrequent, where the use of the area is through nonmotorized, nonmechanical means, and where no or minimal developed recreation facilities are encountered (from BLM Instruction Memorandum 2003-275, Change 1, Considerations of Wilderness Characteristics in Land Use Plans, Attachment 1).

Properly Functioning Condition (PFC): (1) An element of the Fundamentals of Rangeland Health for watersheds, and therefore a required element of State or regional standards and guidelines under 43 CFR 4180.2(b). (2) Condition in which vegetation and ground cover maintain soil conditions that can sustain natural biotic communities. For riparian areas, the process of determining function is described in BLM Technical Reference TR 1737-9. (3) Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment, capture bed load, and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is influenced by geomorphic features, soil, water, and vegetation. (4) Uplands function properly when the existing vegetation and ground cover maintain soil conditions capable of sustaining natural biotic communities. The functioning condition of uplands is influenced by geomorphic features, soil, water, and vegetation. See also *Functioning at Risk* (from H-4180-1, BLM Rangeland Health Standards Manual).

Property of traditional religious and cultural importance: A form of heritage resource referenced within 36 CFR Part 800; a tangible property (district, site, building, structure, or object) that is associated with cultural practices or beliefs of a living community that (1) are rooted in that community's history and (2) are important in maintaining the cultural identity of the community. The significance of these properties lies in the role that they play in a community's historically rooted beliefs, customs, and practices. This term may be considered synonymous with traditional cultural property (TCP; see *Traditional Cultural Property*) and, like TCPs, properties of traditional religious and cultural importance may or may not meet the National Register of Historic Places criteria.

Proposed Species: Species that have been officially proposed for listing as threatened or endangered by the Secretary of the Interior. A proposed rule has been published in the *Federal Register* (from BLM Manual 6840, Special Status Species Manual).

Protect: To cover or shield from exposure, damage, or destruction.

Public Land: Land or interest in land owned by the United States and administered by the Secretary of the Interior through the BLM without regard to how the United States acquired ownership, except lands located on the Outer Continental Shelf, and land held for the benefit of Indians, Aleuts, and Eskimos (from H-1601-I, BLM Land Use Planning Handbook).

Public Land Survey System Dataset: This dataset is part of the Cadastral National Spatial Data Infrastructure publication dataset for rectangular and non-rectangular Public Land Survey System data. This dataset represents the geographic information systems version of the Public Land Survey System; it is not for boundary determination.

Range Improvement: An authorized physical modification or treatment designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; and restore, protect, and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical devices or modifications achieved through mechanical means (43 CFR 4100.0-5) (from H-4180-I, BLM Rangeland Health Standards Manual).

Rangeland: A kind of land on which the native vegetation, climax, or natural potential consists predominantly of grasses, grass-like plants, forbs, or shrubs. Rangeland includes lands revegetated naturally or artificially to provide a non-crop plant cover that is managed like native vegetation. Rangeland may consist of natural grasslands, savannahs, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows (from H-4180-I, BLM Rangeland Health Standards Manual).

Rangeland Analysis Platform: A remote-sensing data set that uses Landsat imagery to estimate the percent cover of coarse functional groups (annual forbs and grasses, perennial forbs and grasses, shrubs, and trees) annually; variation is seen in the year-to-year estimates; therefore, for this analysis, the BLM used average values over a 10-year period.

Rangeland Health Standards: The four standards of physical and biological condition or degree of function required for healthy sustainable rangeland in Utah are the following (from BLM's 1997 Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah):

1. Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian/wetland, and aquatic components; soil and plant conditions support water infiltration, soil moisture storage, and release of water that are in balance with climate and landform, and maintain or improve water quality, water quantity, and timing and duration of flow.
2. Ecological processes, including the hydrologic cycle, nutrient cycles, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.
3. Water quality complies with State water quality standards and achieves, or is making progress toward achieving, established BLM management objectives such as meeting wildlife needs.
4. Habitats are, or are making significant progress toward being, restored or maintained for federal threatened and endangered species, federal proposed, federal candidate, other special status species, native species, and for economically valuable game species and livestock.

Raptors: Birds of prey, such as the eagle, falcon, hawk, owl, or vulture.

Reasonably Foreseeable Future Actions: Actions for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.

Recreational River Areas: Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past (from Section 2(b) of the Wild and Scenic Rivers Act).

Reference Plant Community. Vegetation communities that display a range of ecological conditions that exhibit natural variability, unaltered by anthropogenic agents and exotic species.

Research Natural Area (RNA): An area that is established and maintained for the primary purpose of research and education because the land has one or more of the following characteristics:

1. A typical representation of a common plant or animal association;
2. An unusual plant or animal association;
3. A threatened or endangered plant or animal species;
4. A typical representation of common geologic, soil, or water features; or
5. Outstanding or unusual geologic, soil, or water features.

Restore: To bring back to or put back into a former or original state.

Right-of-Way (ROW): The BLM-managed lands authorized to be used or occupied for the construction, operation, maintenance, and termination of a project, pursuant to a ROW authorization.

Riparian Area: A form of wetland transition between permanently saturated wetlands and upland areas. A riparian area is defined as an area of land directly influenced by permanent (surface or subsurface) water. Riparian areas exhibit vegetation or physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack vegetation and depend on free water in the soil.

Riparian Vegetation: Plants adapted to moist growing conditions along streams, waterways, ponds, etc.

Route: A path, way, trail, road, or other established travel corridor.

Sacred Site: Any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by practitioners of an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site (Executive Order 13007, section 1(b)(iii)).

Scenic Backways: Paved or unpaved routes that have roadsides or corridors of special aesthetic, cultural, or historic value in more remote, less-visited locations. The corridor may contain outstanding scenic vistas, unusual geologic features, or other intrinsic qualities such as cultural, historic, natural,

recreational, and archaeological values. Scenic Backways can be designated at either the State level or by the BLM during the land use planning process.

Scenic Byways: Highway routes that have roadsides or corridors of special aesthetic, cultural, or historic value. The corridor may contain outstanding scenic vistas, unusual geologic features, or other intrinsic qualities such as cultural, historic, natural, recreational, and archaeological values. Scenic Byways can be designated at either the state or the federal level.

Scenic Quality: The relative worth of a landscape from a visual perception point of view.

Scenic River: Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads (from Section 2(b) of the Wild and Scenic Rivers Act).

Scoping: An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This involves the participation of affected federal, state, and local agencies, and any affected Indian tribe, the proponent of the action, and other interested persons, unless there is a limited exception under 40 CFR 1507.31.

Season of Use: The timing of livestock grazing on a rangeland area.

Section 106 Compliance: The requirement of Section 106 of the National Historic Preservation Act that any project funded, licensed, permitted, or assisted by the federal government be reviewed to take into account the effect of the undertaking on may have on historic properties, and that the State Historic Preservation Officer and the Advisory Council on Historic Preservation are afforded the opportunity to comment.

Section 7 Consultation: The requirement of Section 7 of the Endangered Species Act that all federal agencies consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service if a proposed action may affect a federally listed species or its critical habitat.

Seed Collection: Refers to the collection of vegetative seeds from BLM-managed surface land. There are four options that allow the public to collect vegetative materials such as seed from BLM-managed surface lands. These are: (1) Recreational use, (2) personal use, (3) commercial use, and (4) free use. The forms used and fees assessed depend on which option applies to the situation and the intended use of the seed. Seed collection on BLM-managed surface land is generally administered in accordance with BLM Instruction Memorandum 2013176.

Sensitivity Levels: Measures of public concern (that is, high, moderate, and low) for the maintenance of scenic quality.

Sensitive Species: Those species designated by a State Director, usually in cooperation with the State agency responsible for managing the species and State natural heritage programs, as sensitive. They are those species that: (1) could become endangered in or extirpated from a State, or within a significant portion of its distribution; (2) are under status review by the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service; (3) are undergoing significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution; (4) are undergoing significant current or

predicted downward trends in population or density such that federally listed, proposed, candidate, or State-listed status may become necessary; (5) typically have small and widely dispersed populations; (6) inhabit ecological refugia or other specialized or unique habitats; or (7) are State-listed but may be better conserved through application of BLM sensitive species status (from BLM Manual 6840, Special Status Species Manual).

Sky Glow (Ratio of Artificial Sky Brightness to Natural Sky Brightness): Increased apparent brightness of the night sky, compared with natural levels of brightness produced by the Milky Way and zodiacal light, associated with artificial sources of light that reduce visibility for astronomical observation. Lower ratio-to-natural-brightness values correspond to less sky glow and deviation from the natural condition; high values correspond to skies with increased light pollution.

Sky Luminance: Measurement of visible light on a clear, moonless night. For pristine night skies, this is typically measured as 21.9 to 22.0 magnitudes per square arcsecond. Lower values correspond to artificially brighter night skies, obscuring visibility of natural night sky phenomena; higher values (closer to 22.0) correspond to more pristine night skies.

Solitude: Visitors may have outstanding opportunities for solitude, or primitive and unconfined types of recreation when the sights, sounds, and evidence of other people are rare or infrequent, where visitors can be isolated, alone or secluded from others, where the use of the area is through nonmotorized, nonmechanical means, and where no or minimal developed recreation facilities are encountered (from BLM Instruction Memorandum 2003-275, Change I, Considerations of Wilderness Characteristics in Land Use Plans, Attachment I).

Sound-Attenuation Features: Equipment installed on noise-generating facilities or equipment to suppress sound or reduce noise levels during their operation.

Soundscapes: Human perception of the acoustic environment composed of both natural ambient sounds and a variety of human-made sounds.

Special Recreation Management Area (SRMA): A BLM-managed lands unit identified in land use plans to direct recreation funding and personnel to fulfill commitments made to provide specific, structured recreation opportunities (for example, activity, experience, and benefit opportunities). The BLM recognizes three distinct types of SRMAs: destination, community, and undeveloped (from H-1601-I, BLM Land Use Planning Handbook).

Special Status Species: Includes proposed species, listed species, and candidate species under the Endangered Species Act; State-listed species; and BLM State director-designated sensitive species (see BLM Manual 6840, Special Status Species Policy) (from H-1601-I, BLM Land Use Planning Handbook).

Standard: A description of the physical and biological conditions or degree of function required for healthy, sustainable lands (such as Land Health Standards). To be expressed as a desired outcome (goal) (from H-1601-I, BLM Land Use Planning Handbook).

Standards for Boundary Evidence: Standards for secondary sources of boundary evidence; these three sources are (1) land description review, (2) chain of surveys, and (3) a physical inspection of the

land. Execution of the Standards for Boundary Evidence process is intended to identify defections in the boundary, and give guidance to managers to manage risks associated with transactions or projects.

Stratigraphy: The branch of geology that treats the formation, composition, sequence, and correlation of stratified rocks as part of the Earth's crust.

Sulfur dioxide: A gas produced by burning coal, most notably in power plants. Some industrial processes, such as production of paper and smelting of metals, produce sulfur dioxide. Sulfur dioxide is closely related to sulfuric acid, a strong acid. Sulfur dioxide plays an important role in the production of acid rain.

Suppression: All the work of extinguishing or containing a fire, beginning with its discovery.

Surface disturbance: Suitable habitat is considered disturbed when it is removed and unavailable for immediate use. (A) Long-term removal occurs when habitat is physically removed through activities that replace suitable habitat with long-term occupancy of unsuitable habitat such as a road, powerline, well pad, or active mine. Long-term removal may also result from any activities that cause soil mixing, soil removal, and exposure of the soil to erosive processes. (B) Short-term removal occurs when vegetation is removed in small areas but restored to suitable habitat within a few (fewer than 5) years of disturbance. (C) Suitable habitat rendered unusable due to numerous anthropogenic disturbances. (D) Anthropogenic surface disturbances are surface disturbances meeting the above definitions that result from human activities.

Surface-Disturbing Activities: An action that alters the vegetation, surface/near-surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other BLM-managed land values. Examples of surface-disturbing activities may include operation of heavy equipment to construct roads, pits and reservoirs; installation of pipelines and powerlines; and intensive vegetation management (such as prescribed fire). Surface-disturbing activities may be either authorized or prohibited.

Surface Management Agency: This depicts federal land for the United States and classifies this land by its active federal surface-managing agency.

Threatened Species: Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (from BLM Manual 6840, Special Status Species Manual).

Tinajas: Surface depressions in rock formations, particularly sandstone, that collect water and provide habitat for specialized plant and animal species.

Topography: The accurate and detailed description of a place; the arrangement of the natural and artificial physical features of an area.

Total Dissolved Solids (TDS): The total quantity (reported in milligrams per liter) of dissolved materials in water.

Total Maximum Daily Load: An estimate of the total quantity of pollutants (from all sources: point, nonpoint, and natural) that may be allowed into waters without exceeding applicable water quality criteria (from H-1601-I, BLM Land Use Planning Handbook).

Traditional Cultural Landscapes: Landscapes can be defined as large-scale properties often comprised of multiple, linked features that form a cohesive area or place. They have cultural and historical meanings attached to them by the peoples who have traveled, used, and interwoven these places into generations of practice.

Traditional Cultural Property (TCP): A property that is eligible for inclusion in the National Register of Historic Places based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community. Traditional cultural properties are rooted in a traditional community's history and are important in maintaining the continuing cultural identity of the community (from the U.S. Department of Interior, National Park Service National Register Bulletin 38).

Travel Management Areas (TMAs): Polygons or delineated areas where a rational approach has been taken to classify areas as open, closed, or limited, and have an identified and/or designated network of roads, trails, ways, and other routes that provide for public access and travel across the Planning Area. All designated travel routes within travel management areas should have a clearly identified need and purpose as well as clearly defined activity types, modes of travel, and seasons or time frames for allowable access or other limitations.

Trend in Range Condition: An interpretation of the direction of change in range condition. These determinations may relate to ecological site or forage conditions. Also, vegetation trend that is improving (upward), not changing (static), and declining (downward).

Two-Wheel-Drive (2WD): Vehicle clearance generally lower than with a four-wheel drive. Not designed to travel off pavement.

Unallotted (Grazing): An area that is available for livestock grazing under section 3 or section 15 of the Taylor Grazing Act for permits or leases, but currently does not have a permit. Also referred to as a vacant allotment.

Uncharacteristic Wildland Fire: Uncharacteristic to the frequency and intensity within the natural fire regime.

Upland: Refers to areas that receive no extra moisture beyond ambient precipitation.

User Day: Any calendar day, or portion thereof, for each individual accompanied or serviced by an operator or permittee on the BLM-managed lands or related waters; this is synonymous with passenger day or participant day.

Utility: A service provided by a public utility, such as electricity, telephone, or water.

Utility Corridor: A parcel of land that has been identified by law, by secretarial order, through a land use plan, or by other management decision as being the preferred location for existing and future right-of-way grants and suitable to accommodate one type of right-of-way or one or more rows that are similar, identical, or compatible.

Valid Existing Rights: Any authorization or right established. Valid existing rights are established by various laws, leases, and filings made with the BLM.

Vector: The mechanism for transporting weed seed, including natural (wind and wildlife) and human-caused (vehicles and humans) processes.

Vegetation Condition Class: This represents the general level to which current vegetation is different from the estimated historical vegetation reference conditions. There are six classes describing the amount of departure: IA (very low), IB (low), IIA (moderate to low), IIB (moderate to high), IIIA (high), and IIIB (very high).

Vegetation Materials: Refers generally to vegetative materials such as individual plants, wood products, flowers, seeds, etc.

Vegetation Restoration/Management Methods: Mechanical, chemical, biological, and fire vegetation management used to restore and promote a natural range of native plant associations. Treatments are designed for specific areas and differ according to the area's suitability and potential. The most common land treatment methods alter the vegetation by spraying with pesticides, burning, or plowing, followed by seeding with native plant species. Intensive vegetation management include those that would fall under the definition of surface-disturbing activities (such as prescribed fire).

Vertebrate Species: Any animal with a backbone or spinal column.

Visibility (Air Quality): A measure of the ability to see and identify objects at different distances.

Visitor Day: Twelve visitor hours that may be aggregated by one or more persons in single or multiple visits.

Visitor Use: Visitor use of a resource for inspiration, stimulation, solitude, relaxation, education, pleasure, or satisfaction.

Visual Resources Inventory (VRI): The inventory of scenic values based on the factors of scenic quality, sensitivity levels, and distance zones that, when combined, form visual resource inventory classes; these classes indicate the existing scenic values of BLM-managed lands.

Visual Resource Management (VRM): The inventory and planning actions taken to identify visual values and to establish objectives for managing those values, and the management actions taken to achieve the visual management objectives.

Visual Resource Management (VRM) Classes: VRM classes define the degree of acceptable visual change within a characteristic landscape. A class is based on the physical and sociological characteristics of any given homogeneous area and serves as a management objective. There are four classes. Each class has an objective that prescribes the amount of change allowed in the characteristic landscape, as described below:

- Class I: The objective for VRM Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

- **Class II:** The objective for VRM Class II is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class III:** The objective for VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Any changes should repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class IV:** The objective for VRM Class IV is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Visual Resources: The visible physical features of a landscape (topography, water, vegetation, animals, structures, and other features) that constitute the scenery of an area.

Visual Sensitivity Levels: Measures of public concern (that is, high, medium, or low) for the maintenance of scenic quality.

Volatile Organic Compounds: Include gasoline, industrial chemicals such as benzene, solvents such as toluene and xylene, and tetrachloroethylene (perchloroethylene is the principal dry-cleaning solvent). Organic chemicals all contain the element carbon. Organic chemicals are the basic chemicals found in living things and in products derived from living things, such as coal, petroleum, and refined petroleum products. Volatile chemicals readily produce vapors; at room temperature and normal atmospheric pressure, vapors escape easily from volatile liquid chemicals. Many volatile organic chemicals are also hazardous air pollutants.

Water Quality: The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.

Watershed: The fifth level of the hydrologic unit delineation system. A watershed is coded with 10 numerical digits, also referred to as hydrologic unit code (HUC) 10, and watersheds range in size from 40,000 to 250,000 acres (from H-4180-1, BLM Rangeland Health Standards).

Wetlands: Lands including swamps, marshes, bogs, and similar areas, such as wet meadows, river overflows, mud flats, and natural ponds.

Wild and Scenic River (WSR): See *National Wild and Scenic River System*.

Wild River: Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America (from Section 2(b) of the Wild and Scenic Rivers Act).

Wilderness: A congressionally designated area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, that is protected and managed to preserve its natural conditions and that (1) generally appears to have been affected mainly by the forces of nature, with human imprints substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres or is large enough to make practical its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Wilderness Characteristics: Features of the land associated with the concept of wilderness that specifically deal with naturalness and opportunities for solitude and primitive unconfined recreation.

Wildland-Urban Interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels.

Wilderness Study Area (WSA): Areas that have been inventoried and found to have wilderness characteristics as described in Section 603 of the Federal Land Policy and Management Act and Section 2(c) of the Wilderness Act of 1964. These areas are under study for possible inclusion as a Wilderness Area in the National Wilderness Preservation System.

Wildfire: Unplanned ignition of a wildland fire (such as a fire caused by lightning, volcanoes, unauthorized and accidental human-caused fires) and escaped prescribed fires (from 2009 Guidance for Implementation of Federal Wildland Fire Management Policy).

Wildland Fire: Any fire, regardless of ignition source, that is burning outside of a prescribed fire and any fire burning on BLM-managed lands or threatening BLM-managed land resources, where no fire prescription standards have been prepared (from H-1742-1, BLM Emergency Fire Rehabilitation Handbook).

Wildland Urban Interface (WUI): The line, area, or zone in which structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Withdrawal: Removal or withholding an area of federal land from settlement, sale, location, or entry, under some or all of the general land laws and the Mining Law of 1872 for the purpose of limiting activities under those laws in order to maintain other public values in the area or reserving the area for a particular public purpose or program; or transferring jurisdiction over an area of federal land, other than “property” governed by the Federal Property and Administrative Services Act, as amended (40 United States Code 472) from one department, bureau, or agency to another department, bureau, or agency (from the Federal Land Policy and Management Act, Title 43 Chapter 35 Subchapter I 1702(j)). The term withdrawal is also used in Presidential Proclamations 6920 and 9682 to apply to mineral leasing and mineral materials sales.

Woodland: A forest community occupied primarily by noncommercial species such as juniper, pinon pine, mountain mahogany, or quaking aspen groves; all western juniper forestlands are considered woodlands, because juniper is classified as a noncommercial species.

Woodland Products: Woodland products generally refers to forest or woodland products that are found on BLM-managed lands and may be harvested for recreation, personal use, or as a source of income such as harvesting and selling fence posts and poles.

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