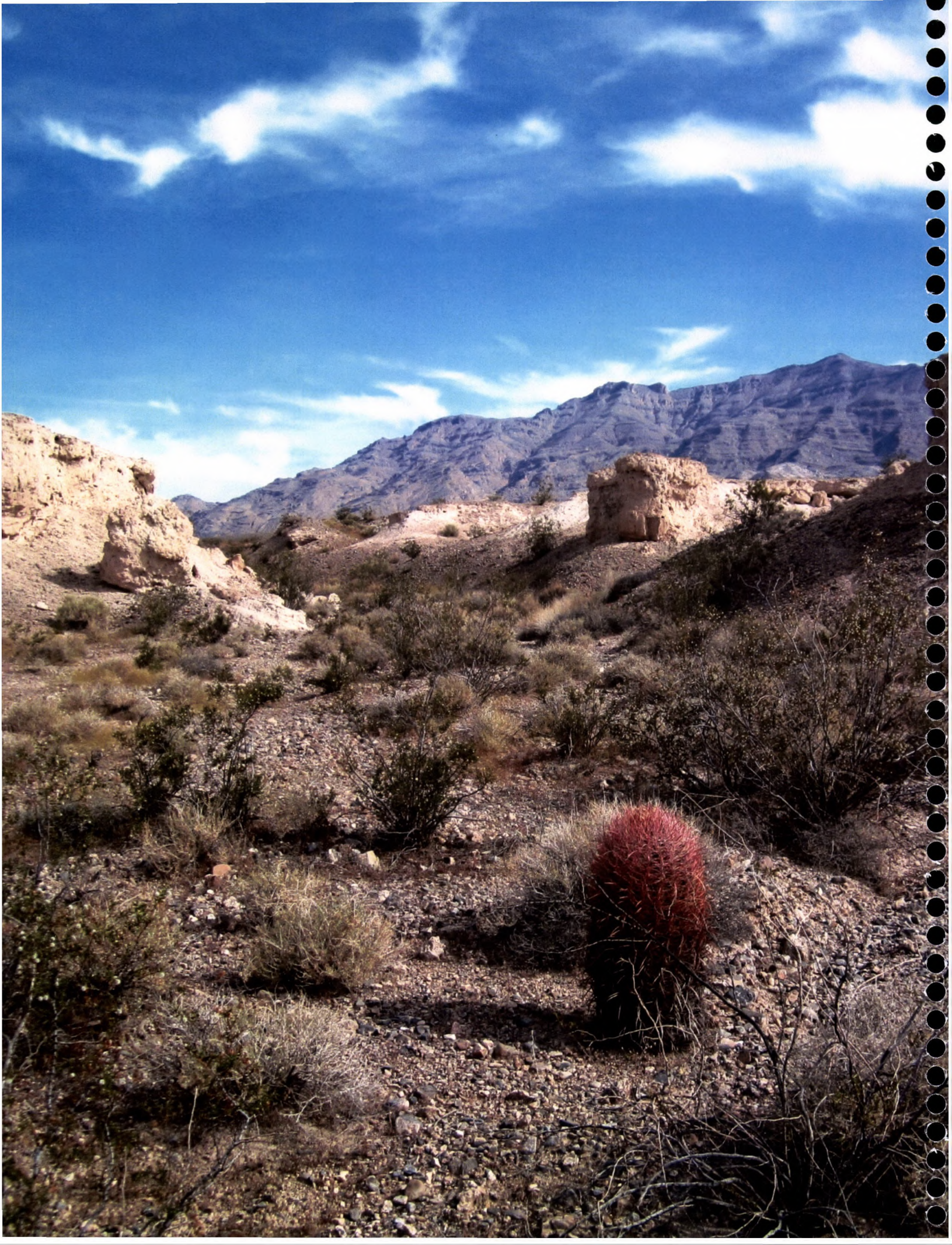
June 2010

National Park Service
U. S. Department of the Interior

Upper Las Vegas Wash / Tule Springs Reconnaissance Report



Upper Las Vegas Wash/ Tule Springs, Nevada

Reconnaissance Report

Prepared by:

U.S. Department of the Interior

National Park Service

Denver Service Center

June 2010

Acronyms

BLM	Bureau of Land Management
NPS	National Park Service
SBCM	San Bernardino County Museum

Much of the background data for this report has been taken from the Bureau of Land Management's *Draft Supplemental Environmental Impact Statement Upper Las Vegas Wash Conservation Transfer Area Las Vegas, Nevada,* which was prepared in January 2010.

This report has been prepared at the request of Senator Harry Reid and Representatives Shelley Berkley and Dina Titus to explore specific resources and advise on whether these resources merit further consideration as a potential new national park system unit. Publication and transmittal of this report should not be considered an endorsement or a commitment by the National Park Service to seek or support specific legislative authorization for the project or its implementation. This report was prepared by the U. *S.* Department of the Interior, National Park Service, Denver Service Center.

Table of Contents

1 SUMMARY

The National Park Service (NPS) prepared this reconnaissance report of the Upper Las Vegas Wash/Tule Springs area in Clark County, Nevada, at the request of Senator Harry Reid and Representatives Shelley Berkley and Dina Titus. The National Park Service was requested to evaluate the national significance of the site's paleontological resources, as well as its rare desert plant and animal species and cultural resources. The request emphasized the importance of the Upper Las Vegas Wash/Tule Springs' late Pleistocene fossils and the history of scientific study and excavation since the 1930s.

View of Mt. Charleston from Upper Las Vegas Wash

This report includes a description and preliminary evaluation of the Upper Las Vegas Wash/Tule Springs' paleontological, natural, and cultural resources based on a field visit and available documentation. Analysis of this information indicates that a preliminary finding of national significance for the paleontological resources in the 23,000-acre Upper Las Vegas Wash/Tule Springs NPS report area appear to be nationally significant. The report area also appears to be suitable for inclusion in the national park system. A preliminary finding for the feasibility of including the report area in the national park system is also indicated, however this initial determination would greatly benefit from a full study of alternatives and would more fully examine site issues such as vandalism, unauthorized removal of fossils, and ORV use that may affect future options for management and protection of the area.

The NPS team recommends that a special resource study be authorized for Upper Las Vegas Wash/Tule Springs. Additional assessment would provide further information on the feasibility of inclusion in the national park system, existing threats to resources, potential boundaries and management options, and the level of public support. The special resource study process should include extensive involvement of local stakeholders, government agencies, businesses, and nonprofit organizations to determine whether NPS involvement and/or potential partnership arrangements are desirable and feasible.

2 BACKGROUND

2.1 Background of the Report

In 1998 Congress passed the Southern Nevada Public Land Management Act (Public Law 105-263) to address concerns associated with the need for developable lands and the management of public lands. The act authorized the U.S. Department of the Interior, Bureau of Land Management (BLM), to dispose of federal lands in Clark County, Nevada. In 2002 the Clark County Conservation of Public Land and Natural Resources Act (Clark County Act, Public Law 107-282) amended the Southern Nevada Public Land Management Act to expand the disposal area to address continuing population growth in the 1,600-square-mile Las Vegas Valley. The northern portion of this expanded disposal area comprises approximately 46,700 acres and includes the Upper Las Vegas Wash/Tule Springs area.

In response to the 2002 Clark County Act, the BLM Las Vegas Field Office prepared the *Draft Supplemental Environmental Impact Statement, Upper Las Vegas Wash Conservation Transfer Area, Las Vegas, Nevada,* to identify the environmental consequences that may result from the disposal of the BLM-managed lands identified in the act. This document identified high concentrations of sensitive natural, cultural, and paleontological resources in the area of the Upper Las Vegas Wash/Tule Springs. Because of these resources, the Bureau of Land Management withheld 5,000 acres of the Upper Las Vegas Wash/Tule Springs area from sale to conduct further study of the resources, analyze the environmental effects of the land disposal, and seek further collaboration with stakeholders. These activities led the Bureau of Land Management to increase its 5,000 acre study to 13,622 acres. These 13,622 acres are referred to as the conservation transfer area (see map on page 7). The Bureau of Land Management expects to complete the final document in fall 2010.

Scientists have long known that the Upper Las Vegas Wash/Tule Springs area contains large concentrations of paleontological resources. The first recorded paleontological exploration of the area occurred in 1933 by the American Museum of Natural History in New York City. Excavations in the 1950s and 1960s revealed abundant large animal fossils such as mammoths, camels, bison, ground sloths, and exotic fauna such as the giant North American lion. A 1962–63 excavation of the area involved massive bulldozed trenches. The investigation became the first site in the United States where scientists applied the newly discovered technique of radiocarbon dating. In 1979 the area encompassing these trenches was listed in the National Register of Historic Places (National Register) for its historic significance in scientific research using radiocarbon dating methods. Named the Tule Springs archeological site, the 1,125-acre National Register-designated area is within the NPS report area and is owned by the state of Nevada.

Field surveys conducted by scientists from the San Bernardino County Museum (SBCM) in 2003 and 2004 identified 438 previously unrecorded paleontological resources within the conservation transfer area. A preliminary survey of the northwest portion of the Las Vegas Wash/Tule Spring area indicates that this upper area is also abundant with significant fossil sites, but to date this area has not been adequately surveyed and documented for paleontological resources.

At the request of the Nevada congressional delegation, this NPS reconnaissance report encompasses about 23,000 acres, which includes the 13,622-acre conservation transfer area and the 9,378 acres of the northwest (upper) portion of the Las Vegas Wash (northwest of the conservation transfer area).

In April 2010 Senator Reid and Representatives Berkley and Titus requested that the National Park Service conduct a reconnaissance report of the Upper Las Vegas Wash/Tule Springs area in Clark County, Nevada, to evaluate the site for inclusion in the national park system. The request highlighted the national significance of the Upper Las Vegas Wash/Tule Springs' paleontological resources, which may be considered among the most significant late Pleistocene paleontological sites in the American southwest. The letter noted the history of the Upper Las Vegas Wash/Tule Springs' research since the 1930s, including the use of radiocarbon dating, and informed the National Park Service of the area's rare desert plant species, including the Las Vegas bearpoppy, Merriam's bearpoppy, Las Vegas buckwheat, and habitat for the endangered desert tortoise.

On June 2 and 3, 2010, NPS staff from the Denver Service Center conducted a field visit to the Upper Las Vegas Wash/Tule Springs report area. The field visit included meetings and a brief field survey with members of the Bureau of Land Management and U.S. Fish and Wildlife Service and scientists from the San Bernardino County Museum, all of whom served as regional experts on the report area and provided background information for the preparation of this report. This report is also informed by the observations made by NPS Paleontologist Dr. Ted Fremd during his site visit in fall 2009 (Fremd 2009).

2.2 Purpose and Scope of this Reconnaissance Report

The purpose of this reconnaissance report is to provide a preliminary analysis of the significance, suitability, and feasibility of the Upper Las Vegas Wash/Tule Springs site for its inclusion in the national park system. Although the National Park Service cannot initiate studies of potential new units of the national park system without the specific authorization of Congress, Congress does permit the National Park Service to conduct preliminary resource assessments and gather data on potential study areas or sites. The term "reconnaissance report" has been used to describe this type of assessment. A reconnaissance report does not typically include the development of management alternatives, but it may briefly note management issues and potential management options.

In the conclusion, the reconnaissance report provides a recommendation as to whether a full special resource study should be prepared for the area. This recommendation is provided to Congress for their deliberation. If the area appears to have some potential as a unit of the national park system, Congress may authorize a special resource study.

When authorized by Congress, NPS staff conduct special resource studies regarding the potential for creating new units of the national park system. These studies apply established criteria, evaluate protection and management alternatives, and provide the basis for the Secretary of the Interior to make recommendations about the study area to Congress.

2.3 Evaluation Criteria

The National Park Service applies criteria for significance, suitability, and feasibility that are listed in NPS *Management Policies 2006*. To be eligible for favorable consideration as a unit of the national park system, an area must

- possess nationally significant natural or cultural resources;
- be a suitable addition to the system;
- be a feasible addition to the system; and
- require direct NPS management instead of protection by some other governmental agency or the private sector.

A reconnaissance report is a partial and preliminary application of these criteria. The criteria and their use in the reconnaissance report are described in further detail below.

2.3.1 National Significance

As described in NPS *Management Policies 2006*, the National Park Service considers a resource nationally significant if it meets all of the following conditions:

- It is an outstanding example of a particular type of resource.
- It possesses exceptional value or quality in illustrating or interpreting the natural or cultural themes of our nation's heritage.
- It offers superlative opportunities for public enjoyment or for scientific study.
- It retains a high degree of integrity as a true, accurate, and relatively unspoiled example of a resource.

The reconnaissance report makes a preliminary evaluation of the national significance of the resources in the report area.

2.3.2 Suitability

Suitability addresses whether the area includes nationally significant natural and/or cultural resources that are not already adequately represented in the national park system or comparably protected for public enjoyment by other public or private organizations. Adequacy of representation is determined on a case-by-case basis by comparing the proposed area to other units in the national park system for differences or similarities in the character, quality, quantity, or combination of resources, and for opportunities for public enjoyment. The suitability analysis also considers whether the area offers interpretive and educational potential and visitor use opportunities.

The reconnaissance report provides a preliminary evaluation of the report area's suitability for inclusion in the national park system.

2.3.3 Feasibility

The National Park Service evaluates whether it would be feasible to include an area as a unit of the national park system considering size and configuration, efficient administration at a reasonable cost, and other factors. The reconnaissance report includes a preliminary evaluation of the feasibility of including the report area in the national park system.

2.3.4 NPS Management Options

Other entities such as state or local government or the private sector may be able to protect resources in the report area, even if the resources are deemed significant, feasible, and suitable for addition to the national park system. NPS management will not usually be recommended if another arrangement can provide adequate protection and opportunity for public enjoyment.

A reconnaissance report does not evaluate management options, but it may note significant management issues and potential management options. If Congress authorizes a subsequent special resource study, and that study deems the area significant, suitable, and feasible for inclusion in the national park system, then the study process will evaluate management options in greater detail than in this report.

(Also see Appendix A. National Park Service *Management Policies 2006*, sections 1.2 and 1.3. for more detail.)

Snow on Gass Peak – Photo courtesy of San Bernardino County Museum

3 DESCRIPTION OF THE REPORT AREA

3.1 Location and Setting

The Upper Las Vegas Wash/Tule Springs report area is in the northwest Las Vegas Valley of Clark County, Nevada, north of the greater Las Vegas metropolitan area. This report area is approximately 23,000 acres of BLM land that is bordered by the Desert National Wildlife Refuge and Clark County Shooting Park to the north, Nellis Air Force Base to the east and northwest, the Las Vegas Paiute Indian Reservation and U.S. Highway 95 to the west, and privately owned residential areas of the cities of Las Vegas and North Las Vegas to the south (see figures 1 and 2). The report area includes land within the city of Las Vegas west of Decatur Boulevard, and in the city of North Las Vegas east of Decatur Boulevard.

The landscape of the report area is characterized by a broad alluvial basin at the base of alluvial fans descending from the Las Vegas and Sheep mountain ranges. The approximately 13-mile Las Vegas Wash traverses the report area in a northwest-southeast direction. The wash is a steeply cut natural flood channel that carries stormwater and runoff from the upper Las Vegas Valley into Lake Mead, which is southeast of the report area. In addition to providing natural flood control, the Las Vegas Wash supports a riparian habitat for a variety of plant and animal species, including special status plant species (Las Vegas bearpoppy, Merriam's bearpoppy, and Las Vegas buckwheat). Erosion in the wash has exposed cultural and paleontological resources. Most of the report area's paleontological resources are adjacent to or within the Las Vegas Wash.

Figure 1
VICINITY
RECONNAISSANCE REPORT
UPPER LAS VEGAS WASH/TULE SPRINGS
United States Department of the Interior
National Park Service

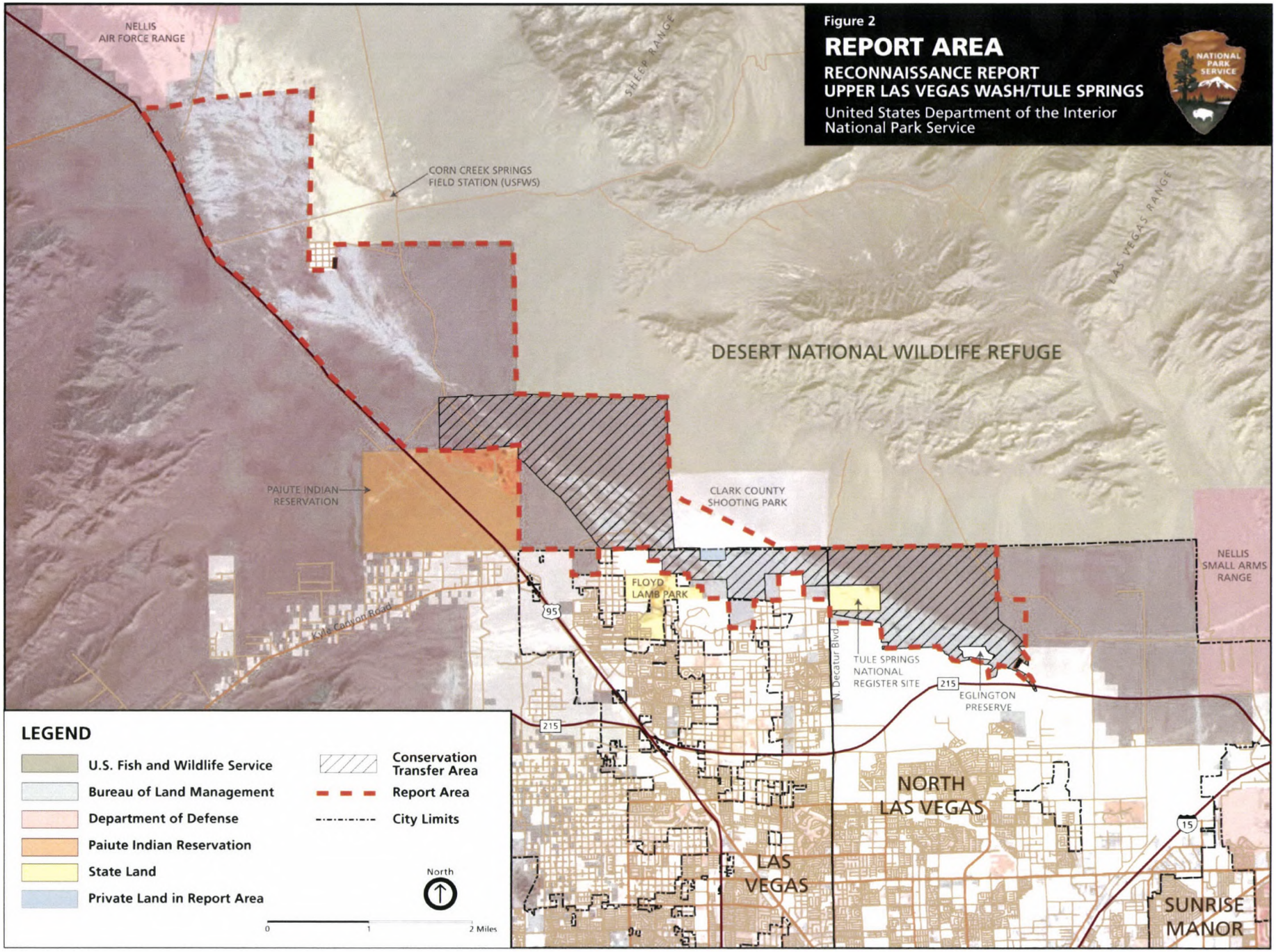


Figure 2
REPORT AREA
RECONNAISSANCE REPORT
UPPER LAS VEGAS WASH/TULE SPRINGS
United States Department of the Interior
National Park Service
NELLIS AIR FORCE RANGE
SHEEP RANGE
CORN CREEK SPRINGS FIELD STATION (USFWS)
LAS VEGAS RANGE
DESERT NATIONAL WILDLIFE REFUGE
PAIUTE INDIAN RESERVATION
CLARK COUNTY SHOOTING PARK
NELLIS SMALL ARMS RANGE
FLOYD LAMB PARK
Kyle Canyon Road
95
N. Decatur Blvd
TULE SPRINGS NATIONAL REGISTER SITE
215
EGLINGTON PRESERVE
NORTH LAS VEGAS
LAS VEGAS
SUNRISE MANOR
15
LEGEND
U.S. Fish and Wildlife Service
Bureau of Land Management
Department of Defense
Paiute Indian Reservation
State Land
Private Land in Report Area
Conservation Transfer Area
Report Area
City Limits
North
0
1
2 Miles

The north part of the greater Las Vegas metropolitan area has been one of the fastest-growing regions in the United States in the past 10 years. Between 1996 and 2006, the region's population increased by almost 800,000, to a total of 1.89 million. Relocation to Clark County was the greatest contributor to this rapid population growth. Although the Nevada state demographer estimated in 2006 that Clark County's population could continue to increase to 2.79 million by 2016, the county's population growth came to a halt in 2008 because of the effects of the nationwide economic recession that hit Clark County particularly hard (BLM 2010a; Lake 2009).

The city of Las Vegas' population growth has mirrored that of Clark County, with an increase of 78.3% between 1990 and 2000 and an increase of 21.2% between 2000 and 2005. The city's population density averages 4,390 persons per square mile, with the highest concentrations in the downtown area and adjacent to U.S. Highway 95. Growth in the city of North Las Vegas has been even more aggressive during this period, with a 130.8% increase between 1990 and 2000, and a 71.9% increase between 2000 and 2006. However, for the first time in nearly a century, the Las Vegas Metropolitan area's population shrank by about 0.7% between 2008 and 2009, losing 15,676 people of the 1,967,716 total in 2008. This was likely caused by the economic recession occurring at the same time (Lake 2009; UNLV 2010). Population data for the Las Vegas Paiute Indian Tribe was not available for this report (BLM 2010a).

Much of the land in the report area is administered by the Bureau of Land Management and is unpopulated and undeveloped. The area provides access to outdoor activities, including the Desert Wildlife Refuge and the Clark County Shooting Park. Native American tribes, including the Las Vegas Paiute Indian Tribe, have also identified the report area as important to Native American traditional beliefs and uses.

Las Vegas skyline from report area

3.2 Land Use and Ownership

3.2.1 Public Lands

Most of the 23,000-acre report area is managed by the Bureau of Land Management. About 1,125 acres, encompassing the Tule Springs archeological site, is owned by the state of Nevada. A smaller portion of the report area (825 acres) is managed by Clark County as part of the Clark County Shooting Park.

Some of the BLM-managed land includes rights-of-way, leases, permits, or mining claims. Powerlines and flood control features are primarily in the southern portion of the report area. The Clark County Regional Flood Control District owns and maintains several flood control structures in the report area. The largest of these is the Decatur detention basin west of Decatur Boulevard and north of Iron Mountain Road and La Concha Drive, which border private land at the south edge of the report area near the Decatur detention basin.

Two powerlines enter the area from the east, generally following Grand Teton Road. A 230-kV (kilo volt) powerline follows the Grand Teton Road west to Decatur Boulevard, where the line turns north along Decatur Boulevard to Moccasin Road. At that intersection, the 230-kV line turns west and follows Moccasin Road until it leaves the report area westward and crosses U.S. Highway 95. A 500-kV powerline parallels the 230-kV line for a short distance along Grand Teton Road in the southeastern part of the report area. The 500-kV powerline then branches northwest across the report area, generally following the Las Vegas Wash to intersect with Moccasin Road and continuing westward, exiting the report area just east of U.S. Highway 95 (BLM 2010a).

In 2005 the Bureau of Land Management, city of North Las Vegas, U.S. Fish and Wildlife Service, and Nevada Division of Forestry agreed to protect a 300-acre area called the Eglington Preserve, located within the south end of the report area and inside the North Las Vegas city limits. The *Conservation Agreement for the Management of Special Resources on Bureau of Land Management Parcels Nominated for Disposal by the City of North Las Vegas* protects the preserve from development, and the preserve is managed by The Nature Conservancy, a nongovernmental organization. Privately owned land frames the preserve to the south, east, and west (BLM 2010a).

Las Vegas Formation within Upper Las Vegas Wash

3.2.2 Private and Other Lands

There is one small area of privately owned land (80 acres) within the report area, south of the Clark County Shooting Park.

Other lands near or adjacent to the report area include the Las Vegas Paiute Indian Reservation, which straddles U.S. Highway 95 and is immediately west of the report area. Privately owned lands in the city of North Las Vegas border the south portion of the report area and consist primarily of residential and commercial development.

3.2.3 Transportation

The paved, two-lane, Decatur Boulevard traverses the southern portion of the report area in a north-south direction to access the Clark County Shooting Park. Within the report area there are several narrow dirt or gravel vehicle trails created by recreational vehicle use. Paved roadways at the south edges of the report area include Moccasin Road, Aliante Parkway, Horse Drive, and Grand Teton Drive — all of which are east-west roads. Access to existing transmission lines, infrastructure, and private property adjacent to the report area generally occurs along Moccasin Road and Grand Teton Drive.

The major transportation corridor near the report area is U.S. Highway 95, a four-lane divided highway that runs northwest-southeast and forms the west border of the report area. The highway links the cities of Las Vegas and North Las Vegas to regions in northern Nevada, such as Indian Springs, Fallon, and Reno. The four-lane divided 215 Beltway (also known as Clark County Highway 215) is on the southeastern end of the report area. The highway connects the cities of North Las Vegas, Las Vegas, Summerlin South, Spring Valley, and Henderson. Development and population growth during the past decade has brought significant increases in traffic congestion on these highways and throughout the Las Vegas Valley.

The cities of North Las Vegas and Las Vegas are working with the Nevada Department of Transportation and the Federal Highway Administration on plans for a proposed parkway corridor to accommodate increased travel demands in the Las Vegas Valley. The proposal is for the Sheep Mountain Parkway (formerly the Mountain Edge Parkway), a 550-foot-wide transportation corridor that would link Highway 215 to U.S. Highway 95 and continue eastward to link with Interstate 15. The proposed project could traverse the northeastern end of the report area.

3.2.4 Local Economy

For the last 50 years, gaming and tourism have been the main drivers of Clark County's local economy. The number of the people visiting the Las Vegas Valley increased from nearly 21 million people in 1990 to 38 million in 2006 — an 81% increase. The tourism, gaming, and service sectors provide the greatest share of employment in Clark County. The economic impact on the county's economy from tourism and conventions totaled an estimated $36.7 billion in 2005. During the 16-year

period between 1990 and 2006, Clark County's labor force increased by 126.8%, and Las Vegas' labor force increased by 100.4%.

3.3 Natural Resources

3.3.1 Topography and Climate

The Upper Las Vegas Wash/Tule Springs report area is in the Great Basin region of the Basin and Range Physiographic Province. Principal mountain ranges include the Spring Mountains to the southwest and the Sheep and Las Vegas ranges to the north. The area consists of a series of broad, alluvial fans that are bisected by the northwest-trending Las Vegas Wash and its tributaries. The Las Vegas Wash is an active drainage system that serves as a conduit for emptying urban runoff and stormwater into Lake Mead. The report area is between 2,113 feet and 3,040 feet above mean sea level in elevation.

The report area's climate is arid, with only 4 to 6 inches of annual precipitation. Rainfall is erratic and mostly occurs during late winter and early spring. Temperatures range from 20°F to more than 100°F.

3.3.2 Air Quality

Air quality analysis for the report area was not available for this reconnaissance report. As of June 7, 2010, the Environmental Protection Agency's nonattainment report rated the level of particulate matter in Clark County as serious (EPA 2010).

3.3.3 Geology and Soils

The report area is geographically characterized by a northwest-trending, down-dropped, wedge-shaped fracture zone that transects the folds and thrust faults of the mountains on either side of the Las Vegas Wash. The Las Vegas Valley floor consists of the alluvial silt, sand, gravel, and lacustrine mudstone beds. Alluvial fan sediments are from the Paleozoic limestone beds of the Spring Mountains to the southwest and the Las Vegas and Sheep mountain ranges to the northeast. Corn Creek and Tule Springs drain the north end of the valley and end in a distributary flat at the wash's southeast end, which extends eastward between the Frenchman and River mountain ranges, and eventually drain into Lake Mead.

The report area's soils consist of a series of exposed, light-colored, clay and silt deposits. The wash's channel banks are predominantly alluvium interspersed with fine-grained deposits characteristic of previous groundwater discharge. The Las Vegas Wash bed is a braid of youngest alluvium, young fan alluvium, and groundwater discharge deposits. Soils in the report area include a variety of gravelly and sandy loams formed in limestone, dolostone, and sandstone.

Although the Las Vegas Wash is in a seismically active area, there have been very few earthquakes that measure greater than 5.0 on the Richter scale. There are several inactive faults that extend through the report area limits, including the Las Vegas Valley Shear Zone. Subsidence, which is settling of the earth's surface, and ground fissures occur within the report area.

3.3.4 Water Resources

There is limited perennial surface water in the report area. The Las Vegas Wash is an ephemeral wash that flows immediately after significant storms, which only occur intermittently, and is part of a network of drainages that convey stormwater runoff from the Las Vegas Valley to Lake Mead. Runoff from the Las Vegas Wash has poor water quality because of high concentrations of soluble salts in the soils; urban stormwater; and intercepted, shallow, poor-quality groundwater. This has a direct impact on the water quality of Lake Mead, which is an important source of drinking water for Nevada and other regions. Although the Clark County Clean Water Coalition has proposed efforts to reduce the volume of wastewater discharged directly to the Lower Wash, including building a pipeline to carry discharged water directly to the lake, this proposal was recently suspended. More recent strategies proposed involve improving existing treatment facilities.

Las Vegas Formation in Las Vegas Wash
– Photo courtesy of San Bernardino County Museum

In 2005 the Nevada Division of Environmental Protection identified an area downstream of the report area as a 303(d) impaired water body because of the total iron and selenium. Suspended sediment particulates are believed to be causing the high levels of iron, but the source of the selenium has not been identified. As a result, the division identified the southeast portion of the Las Vegas Wash, southeast of Telephone Line Road, as a water body in need of further investigation for selenium and total suspended solids.

3.3.5 Vegetation and Wildlife

The report area has a riparian habitat that supports many plant and animal species. Vegetation and wildlife are strongly influenced by the extreme environmental conditions of the Mojave Desert, which is a geographically distinct area of natural communities in portions of southeastern California, northwestern Arizona, southern Nevada, and southwestern Utah. Regional vegetation is characterized by low-growing, widely spaced perennial shrubs, usually composed of only a few species, with cacti and yucca occurring locally. Vegetation in the report area is typical of low elevations of the Mojave Desert and includes creosote bush shrub, desert saltbush shrub, and desert wash shrub vegetation communities. There are three special status plant species identified in the report area — the Las Vegas bearpoppy, Merriam's bearpoppy, and Las Vegas buckwheat. All three

plant species are in rapid decline because of urban development in the Las Vegas Valley. The Las Vegas bearpoppy and Merriam's bearpoppy are both short-lived, evergreen perennial herbs. The Las Vegas bearpoppy is identified by its yellow flowers, and Merriam's bearpoppy is identified by its white flowers. The Las Vegas Valley contains more than one-third of the known Las Vegas bearpoppy habitat. Urban development has extirpated about 27% of the Las Vegas bearpoppy populations in the Las Vegas Valley. Although Merriam's bearpoppy's population has remained stable in the greater Mojave Desert, its population in the Las Vegas Valley has significantly declined. Las Vegas buckwheat is a long-lived perennial shrub that has lost an estimated 30%–50% of its population in the Las Vegas Valley. In 2007 the U.S. Fish and Wildlife Service listed Las Vegas buckwheat as a candidate for federal listing as an endangered species.

Wildlife known in or near the report area include endemic poppy bees, kit foxes, burrowing owls, phainopepla, and a variety of reptiles. Animals listed as sensitive include the western burrowing owl (*Athene cunicularia hypugea*) and phainopepla (*Phainopepla nitens*). The U.S. Fish and Wildlife Service lists the Mojave population of desert tortoise (*Gopherus agassizii)* as threatened and with designated critical habitat in Clark County.

Las Vegas bearpoppy (*Arctomecon californica*) – Photo courtesy San Bernardino County Museum

3.4 Paleontological Resources

3.4.1 Summary History and Overview of Paleontological Resources

By definition, paleontological resources, or fossils, are defined as the remains, imprints, or traces of once-living organisms that have been preserved in rocks and sedimentary deposits. Fossils can include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. They are considered nonrenewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. The following is a brief history of the excavations that have taken place in the report area.

The first paleontological artifact recorded in the report area was discovered in a remnant of an old quarry when workers unearthed a pile of bone from a mammoth. The site subsequently became called "Tule the Baby Mammoth," even though the bone fragment was later identified as an adult mammoth. The discovery led to the Tule Springs expedition, led by paleontologist Fenley Hunter of the American Museum of Natural History, as the first major effort to explore the paleontological resources of the Las Vegas Wash (Simpson 1933).

Scientists Mark Raymond Harrington and Ruth DeEtte Simpson of the Southwest Museum in Los Angeles, California, led numerous investigations of the Las Vegas Wash between 1933 and 1956. Although they surmised that their findings could contain evidence of early contact between early humans and extinct late ice age animals, these hypotheses were later debunked by scientists in the 1960s using radiocarbon dating.

In 1962 scientists from the Nevada State Museum began excavations using massive bulldozed trenches in the report area. Called the "Big Dig," the methods involved creating numerous trenches incised into the wash landscape, one of which is a mile long. The excavation identified rare mammal fossils including Columbian mammoth, ground sloth, American lion, camels, bison, and ancient species of horse. The investigation is most significant as the first application of radiocarbon dating in the United States, and the site is listed in the National Register of Historic Places for this historic scientific breakthrough in dating methods. Using radiocarbon dating, the Nevada State Museum scientists dated the organic materials from fossilized bones to 23,800 to 28,000 years ago. The radiocarbon dating also produced no evidence to support the theory of human occupation of the region more than 11,000 years ago (Mawby 1967; Mehringer 1965; Shutler 1968). *National Geographic* magazine publicized this investigation in 1962.

Bulldozed trench from the 1962 "Big Dig"

The report area received little scientific attention between the 1960s and the 1990s. Interest in the site's paleontological resources resumed when scientists began to study the fossils from the Upper Las Vegas Wash and, for the first time, understand the national significance of its paleontological resources.

In 2004 almost 10,000 fossils were removed from the southern portion of the report area before construction of 36 powerline towers through the wash. These fossils were curated in the San Bernardino County Museum. In 2008 the Bureau of Land Management awarded scientists from the San Bernardino County Museum a federal assistance agreement called the "Upper Las Vegas Wash Conservation Transfer Area (CTA) — Treatment, Protection, and Interpretation of Heritage Paleontologic Resources through Public Involvement." The grant allows SBCM staff to direct volunteers in the collection and curation of fossils from two sections near the Tule Springs archeological site. The project involves SBCM geologists and paleontologists training local

volunteers to help provide preliminary reconnaissance and photographic identification of paleontological resources for museum staff, who subsequently document, remove, and curate the fossils in the museum's repository. In addition to curation, the project includes geologic mapping and research that includes the general public, providing opportunities for education, interpretation, and site stewardship. This project is ongoing.

Bison 'alleni' from Tule Springs – Photo courtesy of American Museum of Natural History

3.4.2 Paleontological Resources of the Report Area

Scientists have confirmed that the Upper Las Vegas Wash/Tule Springs report area contains a significant concentration of paleontological resources from the late Pleistocene. Investigations of the Las Vegas Formation identified abundant and highly diverse assemblages of fossil vertebrates, mollusks, and ichnofossils that represent both extinct and extant species. Many of these fossils are fragments and postcranial flakes of bone and scattered dental or tusk elements from poorly preserved mammoths. Las Vegas Formation fauna identified in the report area include large vertebrate fossils, such as mammoths, ground sloths (two species), horses (three species), bison, camels, and giant North American lion (Fremd 2009). Microfossils from the Las Vegas Formation in the report area include remains of rabbits, rodents, birds, reptiles, amphibians, and aquatic mollusks. Paleontologists consider these fossils to be rare because they are not preserved in the same abundance or diversity elsewhere in the Mojave Desert or southern Great Basin region. Although these fossil sites occur in late Pleistocene sediments, portions of the report area are underlain by thin deposits of late Quaternary (latest Pleistocene to Holocene) younger alluvium with fewer paleontological resources (SBCM 2010).

To date researchers have recorded 436 paleontological sites within approximately two-thirds of the report area. About one-third of the report area, the northwest end, has not been intensively studied or documented for its

paleontological resources. SBCM scientists believe that this unstudied area may contain the best examples of late Pleistocene fossils in the region. Please refer to appendix B for a complete faunal list for the fossil animals found in the area.

3.5 Cultural Resources

3.5.1 Summary History and Overview of Cultural Resources

3.5.1.1 Prehistory

Prehistoric use of the report area extends back to the Paleoindian period of human occupation in southeastern Nevada. Although evidence of occupations from the Paleoindian period is rare, some authors have hypothesized a single Paleo-Archaic period that spans the years between 10,000 and 5,500 BC. Paleoindian sites and artifacts found in southern Nevada typically consist of surface deposits of fluted points that suggest that a Clovis complex existed in some parts of the region. One fluted projectile point has been found and identified in the Las Vegas Wash in Clark County Wetlands Park, which is at the east side of the Las Vegas Valley where the Las Vegas Wash drains under Lake Las Vegas and eventually to Lake Mead (Clark County 2010). No other cultural deposits associated with this artifact have been found. Although few Archaic sites dating to the Pinto period of around 5,000 BC have been identified in the Las Vegas Valley, Pinto components such as surface lithic scatters have been identified in the area of Tule Springs. Several Late Archaic sites are within several miles of the report area.

The Ancestral Puebloan (Anasazi), Patayan, and Numic agricultural groups were present in southern Nevada during the Ceramic period of 300 to 1500 AD. One ceramic assemblage from this period has been identified in the report area (site 26Ck6910). A Patayan intaglio, which is an image or shape carved into the surface of the ground, was identified in the report area as eligible for inclusion in the National Register (site 26Ck4509).

Spanish explorers from New Mexico are believed to have traveled the region by 1600 AD and may have had contact with the Southern Paiutes in the Las Vegas Valley. Direct contact began in the late 1700s when members of the Dominguez and Escalante party traveled through the Mojave Desert in Nevada on portions of what would become the Old Spanish Trail. The route became a major part of trade between the western interior and settlements on the West Coast, and the trail brought many travelers on westward expeditions through the Las Vegas Valley area in particular for its abundant artesian spring water. Spanish traveler Rafael Rivera was among the first Euro-Americans to traverse the valley. Discovering a verdant landscape of wild grasses, Rivera named the area Las Vegas, which translates to "the meadows" in English (City of Las Vegas 2010).

Captain John C. Fremont is considered among the first Euro-Americans to traverse the Las Vegas Valley east to west. Fremont's use of the Old Spanish Trail in 1844, followed by the publication of his notes describing two springs and trail maps in 1845, brought more travelers to the valley. More travelers led to new north-south routes between Santa Fe and San Gabriel in 1848. The Old Spanish Trail eventually merged with the Mormon Road between Utah and California.

3.5.1.2 Late Nineteenth Century Settlement

Although the trails aided westward migration to California, abundant springs encouraged settlement in the Las Vegas Valley. In 1855 members of the Mormon Church from Utah became the first Euro-Americans to settle in the valley and establish a fort at the halfway point along the Mormon Road between Salt Lake City and Los Angeles, where they traveled for supplies. This settlement led to the first direct and sustained contact between Native American tribes and Euro-Americans in the valley. The valley's alkaline soils led to failed attempts to subsist on farming, and the early Mormon settlement was short-lived as a result. Most of the Mormon settlers returned to the Utah by 1857.

The Homestead Act of 1862, followed by the formation of the Nevada Territory in 1864, brought an influx of Euro-American settlers to the Las Vegas Valley as part of the nationwide western movement to the American West. The Homestead Act enticed homesteading with its allotment of 160 acres to each settler, with full ownership granted after five years' residency on the property. The Mormon Road guided travelers to the Las Vegas Valley and led an increasing population of newcomers to settle in the valley. Wagon trails are evidence of these early settlements. One such wagon trail that traverses the report area near the Las Vegas Paiute Indian Reservation is listed in the National Register (26Ck6507). The State Land Act of 1885 encouraged agricultural activity in the region by selling land at $1.25 per acre. At the same time, discovery of minerals and precious metals launched the mining industry in southern Nevada in the late 19th century, with the Las Vegas settlement serving as a regional supply center (City of Las Vegas 2010).

3.5.1.3 Twentieth Century Urban Development

The construction of the Las Vegas and Salt Lake City, Los Angeles, and San Diego Railroad through the Las Vegas Valley in 1905 transformed the small Las Vegas settlement into a railroad town. Like the trails before it, the railroad's Las Vegas stop was a halfway point (between Salt Lake City and Los Angeles) where travelers could draw on the valley's plentiful water supply. Speculators purchased and subdivided 110 acres near the railroad station and established the original Las Vegas town grid. In 1906 the Las Vegas and Tonopah Railroad line connected the town of Las Vegas to the mining districts northwest of the Las Vegas Valley. Stops along the route to Tonopah included Tule and Corn Creek near the report area. A campsite associated with the Las Vegas and Tonopah Railroad has been identified near the report area (26Ck5596). Much of the Las Vegas and Tonopah Railroad's rails were removed in 1917 for scrap during World War I, and the line went out of business in 1918 (City of Las Vegas 2010).

Fremont Street 1906-1908

Las Vegas and Tonopah Railroad

The city of Las Vegas incorporated in 1911 with a population of 800, while 3,321 people inhabited Clark County. Las Vegas continued to serve as a railroad supply depot through the first and second decades of the 21st century. Nevada's adoption of liberal divorce laws attracted divorce seekers to the valley to obtain the mandatory six-week residency to qualify. Dude ranches hosting the short-term residents emerged outside town to fulfill the demand, marking the beginning of valley's tourism trade.

In 1928 the federal government announced that a dam would be built across the Colorado River at the Black Canyon 30 miles southeast of Las Vegas; this transformed the small town into a bustling city. Work on what would become Hoover Dam began in 1929. The massive construction effort drew job seekers from everywhere following the stock market crash of 1929 and the Great Depression to follow. Although the workers were housed in the federally controlled town of Boulder City next to the work site, Las Vegas quickly became an oasis for gambling and speakeasies during

Prohibition. President Franklin Delano Roosevelt inaugurated the Boulder Dam (later renamed the Hoover Dam) on September 30, 1935. The dam's surge of hydroelectric power electrified Clark County, and formation of Lake Mead brought a much-needed source of drinking water to the valley. In 1930 the population totaled 5,165 in Las Vegas and 8,532 in Clark County. By 1940 the city's population had grown to 8,422, while the county population doubled to 16,414 (*Las Vegas Sun* 2010).

The World War II military buildup on the homefront included the U.S. War Department's establishment of the Las Vegas Army Air Corps Gunnery School on undeveloped land in the north Las Vegas Valley, due east of the report area. After the war ended, the installation reopened as Nellis Air Force Base in 1950. Las Vegas' gaming industry skyrocketed in the valley following the war; military growth also occurred at this time. The region enjoyed the nation's postwar economic growth that brought a new American lifestyle that included leisure time and an unprecedented pursuit of recreational activities. Casinos in the Las Vegas' downtown district expanded to meet increased demands while large casino-hotel complexes opened south of the city limits along the Los Angeles Highway, which was also called "The Strip." The McCarran Field airstrip reopened as McCarran International Airport in 1948, expanding the Las Vegas Valley's accessibility as a hub of commerce, military activity, and tourism. By 1950 Clark County's population had swelled to 48,289, with about half of its residents living within the Las Vegas city limits (*Las Vegas Sun* 2010).

Urban development and population growth in the Las Vegas Valley has increased exponentially during the last 50 years of the 20th century. Development has steadily spread northward in the cities of Las Vegas and North Las Vegas in the past 10 years to the point where most of the privately owned lands in both cities currently abut the BLM-owned lands of the report area.

3.5.2 Cultural Resources of the Report Area

Cultural resource investigations conducted in 2003 and 2004 for the BLM's *Draft Supplemental Environmental Impact Statement, Upper Las Vegas Wash Conservation Transfer Area, Las Vegas, Nevada* (ongoing) identified five sites in or near the report area that are listed in or have been determined to be eligible for inclusion in the National Register.

One is a prehistoric artifact scatter called Tule Springs (site 26Ck247) that contains paleontological resources. The site was listed in the National Register in 1979 for its importance in understanding paleoenvironments and for its association with important advances in archeological methods and analysis, including radiocarbon dating. Please see section 3.4 Paleontological Resources above for more information on the historic Tule Springs site.

Another site (site 26Ck4509) is one of the few known intaglios in Nevada, and it is eligible for listing in the National Register. Stone alignments and rock rings in the report area may also be indicative of Patayan traditional use of the region, and these sites may also be eligible for inclusion in the National Register.

A third site (site 26Ck6910) is a prehistoric hearth feature containing ceramic and lithic fragments. This site is National Register-eligible for its potential to provide information about prehistoric

chronology, cultural interaction, subsistence, environment, and use of wetlands in the Las Vegas Valley.

A historic wagon road that linked Las Vegas to Tonopah is the fourth site (site 26Ck6507). Called the Tonopah Wagon Road, the route carried people and materials to the gold fields north of Las Vegas during the late 19th century until it was supplanted by the railroad. It is National Register-eligible for its association with the expansion of Nevada's transportation system before the arrival of the railroad to the Las Vegas Valley. The fifth site (site 26Ck5596) is a camp associated with the former Las Vegas and Tonopah Railroad.

3.5.2.1 Traditional Cultural Properties

The entire report area encompasses an area that has been identified by the Southern Paiute people as a cultural landscape of great significance and as a potential traditional cultural property. The landscape is considered to be a spiritual place for connecting with the past. Also the Paiute people used the Las Vegas Wash (and other washes) as a traditional place for interring their dead. The Las Vegas Wash may also be significant to additional tribes, such as the Chemehuevi and Moapa Paiute.

In light of these significant ethnographic and Native American religious concerns associated with the Las Vegas Wash area, further examination should consider the entire report area to be a potential traditional cultural property in a future assessment of impacts, which must involve government-to-government consultation between the lead federal agency and the tribes regarding these concerns.

3.6 Recreational Resources and Community Use

The BLM lands within the report area are designated as the Las Vegas Special Recreation Management Area. The Bureau of Land Management coordinates with Clark County and city governments to facilitate the provision of open space areas, recreational trails, and parks for local residents.

Overlapping a portion of the report area is the Clark County Shooting Park, completed in fall 2009. The Clark County Shooting Park is intended to provide venues for rifle, pistol, shotgun, and archery shooting, informal daily and event shooting opportunities, firearms safety training and skill development, hunter education, and conservation education programs. In addition, there will be a specialized "tourism range" for group shooting activities and classrooms for conferences.

Due south of the report area are the 680-acre Floyd Lamb Park, owned by the city of Las Vegas, and the 160-acre Willie McCool Regional Park, which is leased from the Bureau of Land Management. Due west of the report area is the Las Vegas Paiute Golf Resort in the Las Vegas Paiute Indian Reservation, which is 1,798 acres.

North of the report area is the Desert National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service. The Desert National Wildlife Refuge is the largest national wildlife refuge in the lower 48 states. The refuge includes the Sheep Mountain Range and supports habitat for desert bighorn sheep and other species. Recreation opportunities include camping, hiking, backpacking, bird watching, horseback riding, and off-road vehicle use on designated roads and trails. Limited hunting for desert bighorn sheep is permitted once a year between November and January.

Corn Creek Springs Area, Desert National Wildlife Refuge

The U.S. Fish and Wildlife Service has a small field station and information kiosk at the Corn Creek Field Station, which is due east of the north end of the report area. The U.S. Fish and Wildlife Service is designing a new visitor center and administrative complex that will accommodate more than 100,000 visitors annually. The center will serve as the main entrance to Desert National Wildlife Refuge and will include a staffed visitor station and information kiosks and house staff offices. Plans for the visitor center include expanded parking areas, roads, utilities, and infrastructure, as well as improvement of some trails in the Corn Creek Springs area to enhance visitor opportunities. The new buildings are being designed to meet Leadership in Energy and Environmental Design standards. Habitat rehabilitation would occur throughout the Corn Creek Springs area.

The U.S. Forest Service is planning a new visitor center complex west of the report area on the west side of U.S. Highway 95 in Kyle Canyon. The proposed visitor center is accessed by Kyle Canyon Road from the highway. It will serve as an access point to Mount Charleston and the Humboldt-Toiyabe National Forest from Las Vegas (U.S. Forest Service 2006).

4 PRELIMINARY EVALUATION OF RESOURCE SIGNIFICANCE

4.1 Introduction

The National Park Service has adopted four criteria to evaluate the national significance of proposed areas. These criteria, listed in NPS *Management Policies 2006*, state that a resource is nationally significant if it meets all of the following conditions:

- It is an outstanding example of a particular type of resource.
- It possesses exceptional value or quality in illustrating or interpreting the natural or cultural themes of our nation's heritage.
- It offers superlative opportunities for public enjoyment or for scientific study.
- It retains a high degree of integrity as a true, accurate, and relatively unspoiled example of a resource.

The NPS team conducted a preliminary analysis of Upper Las Vegas Wash/Tule Springs resources based on existing documentation, the NPS team site visit in June 2010, and discussions with local resource experts.

The NPS team's preliminary finding identified nationally significant paleontological resources in the report area. The evaluation of these paleontological resources is described in this section. NPS paleontology resource experts contributed expertise, research, and technical review of this preliminary evaluation of significance.

In addition, several locally significant cultural and natural resources were also identified in the report area. However, these resources are not likely to be found significant at a national level or meet the NPS criteria for significance. They are not analyzed further.

4.2 Preliminary Evaluation of Significance

Upper Las Vegas Wash/Tule Springs is potentially nationally significant under the following two themes and topics.

Primary theme: Paleontology

Rare Late Pleistocene Epoch Fossils

Scientific excavation and findings in the Las Vegas Wash indicate that the report area contains the single largest open-site assemblage of vertebrate fossils from the end of the Pleistocene epoch found in the Mojave Desert and the southern Great Basin. As such, these fossils comprise the most significant late Pleistocene paleontological resources in the American southwest (SBCM 2010).

Significant Paleoenvironments

Microfossils found in the Las Vegas Formation within the report area include remains of rabbits, rodents,

birds, reptiles, amphibians, and other small animals. These microfossils provide research potential to study paleoenvironments in extremely focused regions through well-defined periods of geologic time. According to scientists from the San Bernardino County Museum, this area of research remains unexplored because the Las Vegas Formation was largely uninvestigated until the 1990s when scientists first realized the extent and potential significance of the Upper Las Vegas Wash/Tule Springs area (SBCM 2010).

Geologic Periods Represented

The Las Vegas Formation also stands out for its representation of fossils that span a long geologic period extending from nearly 200,000 years ago until 3,000 years ago. No other abundantly fossiliferous sites representing the late Pleistocene epoch span as broad a period of geological time. As indicators of past groundwater discharge, the wash's sediments closely track hydrologic change through the last two glacial maxima. No other fossil-bearing site in the American southwest tracks this critical time period. The report area also serves as an important research area because it demonstrates multiple important global climate cooling and warming episodes in the desert regions of the southwest (SBCM 2010).

Excavating baby mammoth teeth

Visitors in an excavated trench

Secondary theme: Paleontological Dating

Early Radiocarbon Dating and Trenches

Portions of the report area have been determined historically significant and are listed in the National Register for the early use of radiocarbon dating because the method's application in Tule Springs in 1962 was its first use in the United States. Part of that investigation included a series of large bulldozed trenches, one of which was a mile long. The trenches provided an opportunity for scientists to study the geologic strata of the Las Vegas Formation. The trenches still exist today and are evidence of this early and historic scientific study, although there are some areas of erosion and portions that are collapsed.

Ongoing Application of Advanced Dating Methods

Scientific investigations since the 1990s have allowed for a greater understanding of the prehistoric timeline. The report area continues to be scientifically important for its current application of cutting-edge research and dating techniques, including radiometric dating, DNA analysis, and isotope studies (SBCM 2010).

4.3 Opportunities for Public Enjoyment and Scientific Study

4.3.1 Opportunities for Public Enjoyment

The Upper Las Vegas Wash/Tule Springs report area has the potential to offer exceptional interpretive value for its paleontological resources. Educational opportunities for local volunteer groups already initiated by the San Bernardino County Museum could easily be expanded to include local schools and colleges, such as the University of Nevada at Las Vegas.

4.3.2 Opportunities for Scientific Study

The high level of integrity of the fossils of the Las Vegas Formation provides scientists with an unparalleled opportunity for research on paleontological and prehistoric resources. The rare confluence of geologic forces in the report area provides researchers an opportunity to examine how the ancient animals looked, behaved, and interacted with one another, and it provided an opportunity to demonstrate and interpret more than 150,000 years of climate change. The report area is also a good candidate for state-of-the-art analytical and dating techniques such as radiometric dating, DNA analysis, and isotope studies (SBCM 2010).

4.4 Resource Integrity

4.4.1 Integrity of the Paleontological Resources

Man-made intrusions in the report area are numerous in light of the area's urban interface. Some exposed paleontological sites have been vandalized through the unauthorized removal of fossils. Trash and rifle shells remain in the northern portion of the report area where shooting is permitted. A substantial amount of rubbish dumping has occurred in areas of the south and west fringes of the report area that are most easily accessible to off-road vehicles.

Utility corridors and infrastructure have been constructed within or adjacent to the wash. The largest of the flood control features in the wash consists of a tall concrete and rock diversion channel that extends across the wash in the report area west of Decatur Boulevard. The development of the paved, two-lane Decatur Boulevard that leads to the new Clark County Shooting Park also interrupts the natural channel and associated landscape features of the wash. A large powerline corridor exists along Moccasin Road and runs east-west through the report area. These structures are relatively large and have negatively impacted the natural setting of the Las Vegas Wash in these areas.

Although extensive urban development has occurred adjacent to the report area in recent years, the integrity of the significant paleontological resources in the wash remains largely intact and in good condition overall. The residential development, Clark County Shooting Park, and flood control features have a prominent visual impact above the wash. However, when one is in the wash, the features are not visible or are less visually intrusive.

The natural erosion of the wash slowly but steadily exposes the fossils embedded in the walls and surface of the wash. This degradation of the channel walls means that more fossils will slowly be

revealed, but this is not considered to be a significant detrimental impact to the area's paleontological resources.

This analysis is a preliminary assessment of the report area's integrity, and further investigation would be needed to fully determine overall integrity of the area.

4.5 Conclusion

Based on this preliminary analysis, the NPS team has determined that the Upper Las Vegas Wash/ Tule Springs area has resources that indicate a preliminary finding of nationally significance as the single largest open-site assemblage of vertebrate fossils from the end of the Pleistocene epoch found in the Mojave Desert and the southern Great Basin. The Las Vegas Wash/Tule Springs area also stands out among other sites for its representation of fossils that span a time from nearly 150,000 to 3,000 years ago. No other abundantly fossiliferous sites representing the late Pleistocene epoch span as broad a period of geological time.

Further inventory, documentation, and assessment will better delineate the paleontological resources present in the report area. This is particularly important in the northern one-third of the report area where paleontological investigation has not yet occurred.

5 PRELIMINARY EVALUATION OF SUITABILITY

5.1 Introduction

An area is considered suitable for addition to the national park system if it represents a natural or cultural resource type that is not already adequately represented in the national park system, or is not comparably represented and protected for public enjoyment by other federal agencies; tribal, state, or local governments; or the private sector.

Adequacy of representation is determined on a case-by-case basis by comparing the proposed area to other national park system areas for differences or similarities in the character, quality, quantity, or combination of resource values, and opportunities for public enjoyment. The suitability analysis also considers whether the area offers interpretive and educational potential and visitor use opportunities. The comparison results in a determination of whether the proposed new area would expand, enhance, or duplicate resource protection or visitor use opportunities found in other comparably managed areas (NPS *Management Policies 2006*, 1.3.2).

5.2 Preliminary Evaluation of Suitability

The NPS team first examined whether or not this resource type is already adequately represented at other units of the national park system. Many national park system units contain fossil

concentrations representing a broad range of geologic history. Other national park units containing paleontological resources representing Pleistocene megafauna and microfauna include the following:

- Agate Fossil Beds National Monument (Nebraska)
- Arches National Park (Utah)
- Badlands National Park (South Dakota)
- Channel Islands National Park (California)
- Florissant Fossil Bed National Monument (Colorado)
- Fossil Butte National Monument (Wyoming)
- Glen Canyon National Recreation Area (Arizona, Utah)
- Hagerman Fossil Beds National Monument (Idaho)
- John Day Fossil Beds National Monument (Oregon)
- Joshua Tree National Park (California)
- Oregon Caves National Monument (Oregon)

Although paleontological resources of the late Pleistocene epoch appear to be well represented in the national park system, scientists assert that the paleontological resources identified in the Upper Las Vegas Wash/Tule Springs report area represent the single largest open-site assemblage of vertebrate fossils from the end of the Pleistocene epoch found in the Mojave Desert and the southern Great Basin. As such, these fossils comprise the most significant late Pleistocene paleontological resources in the American southwest. They are not currently represented in this concentration and geographical location in the national park system. Moreover, no other site with abundant fossils represents the late Pleistocene epoch in as broad a time frame as the more than 150,000-year span evident in the report area (SBCM 2010).

The Upper Las Vegas Wash/Tule Springs report area's secondary theme of "paleontological dating" is unmatched elsewhere in the national park system because the Tule Springs archeological site is the location of the first use of radiocarbon dating in the United States.

5.3 Conclusion

Based on this preliminary analysis, Upper Las Vegas Wash/Tule Springs' significant resources appear to be a suitable addition to the national park system because they represent resource types that are not adequately represented in the national park system. Upper Las Vegas Wash/Tule Springs' resources represent several aspects of the "Paleontology" primary theme and "Paleontological Dating" secondary theme. The fossils in the Upper Las Vegas Wash/Tule Springs report area provide opportunities to interpret the late Pleistocene epoch in the southwestern United States that are not currently represented in the national park system.

Further study would be needed to conduct an in-depth comparative analysis between the Upper Las Vegas Wash/Tule Springs area and other national park system units that contain abundant fossils of the late Pleistocene epoch.

6 PRELIMINARY EVALUATION OF FEASIBILITY

6.1 Introduction

To be feasible as a new unit of the national park system, an area's natural systems or historic settings must be of sufficient size and shape to ensure sustainable resource protection and visitor enjoyment, and the area must have potential for administration by the National Park Service at a reasonable cost. In evaluating feasibility the National Park Service considers a variety of factors for an area, including the following:

- size and boundary configurations
- landownership patterns, local planning and zoning, and current and potential uses of the area and surrounding lands
- access and public enjoyment potential
- current and potential threats to the resources and existing degradation of resources
- costs associated with acquisition, development, restoration, and operation; staffing requirements
- the economic/socioeconomic impacts of designation as a unit of the national park system
- the level of local and general public support (including landowners)

The feasibility evaluation also considers the ability of the National Park Service to undertake new management responsibilities in light of current and projected availability of funding and personnel.

An overall evaluation of feasibility will be made after considering all of the above factors. However, evaluations may sometimes identify concerns or conditions rather than simply reach a yes or no conclusion. For example, some new areas may be feasible additions to the national park system only if landowners are willing to sell, or the boundary encompasses specific areas necessary for visitor access, or state or local governments will provide appropriate assurances that adjacent land uses will remain compatible with the area's resources and values (NPS *Management Policies 2006* 1.3.3).

This preliminary feasibility analysis is based on available public information and the NPS team's site visit in June 2010. A reconnaissance report is limited in scale and does not include broad public input and review. Therefore, some factors cannot be fully addressed — such as the level of local and general public support, availability of land for acquisition, the socioeconomic impacts of designation as a unit of the national park system, and costs associated with operations of a unit of the national

park system. If a full special resource study is conducted, these factors would be addressed at that time.

6.2 Preliminary Evaluation of Feasibility Criteria

6.2.1 Size and Boundary Configurations

The 23,000-acre report area appears to be of sufficient size and configuration to provide for operation of a public site. As stated previously, the report area is almost entirely owned by the Bureau of Land Management, which has managed and protected its resources to date. The report area is fairly well-defined by the properties at its edges, including the Desert National Wildlife Refuge to the north, privately owned lands and roadways to the south, and U.S. Highway 95 and the Las Vegas Paiute Indian Reservation to the southwest. These areas provide ample buffering between the wash site and the adjacent land uses. Further research is recommended to determine the exact boundary configuration that would best contribute to long-term protection of the report area's significant resources.

6.2.2 Access

The report area's location at the north edge of a large metropolitan area would allow for easy access by a large number of people. The area is approximately 20 miles from McCarran International Airport. Access to major transportation corridors includes the 215 Beltway, which is south of the area, and U.S. Highway 95 on the northwest end.

The Bureau of Land Management restricts access to the area using locked gates at several gravel roads. However, the entire report area is open and unsecured and accessible by foot. The northwest portion of the report area is open to recreational shooting activities permitted by the Bureau of Land Management.

Road construction is anticipated in the areas adjacent to the report area. Although these roadways would provide additional traffic and potential indirect impacts to the report area, the location of these transportation corridors would also increase convenient access to the site.

The area's proximity to metropolitan Las Vegas would facilitate access to paleontological resources that is not commonly found among many of the nation's paleontological state parks and NPS sites. Moreover, Las Vegas' global tourism industry could allow the area to be enjoyed by local residents and people traveling from outside the region. At the same time, the report area's urban interface could expose its sensitive resources to unintended uses.

6.2.3 Landownership Patterns and Local Planning and Zoning

Most of the report area is federally owned by the Bureau of Land Management. The state owns the 1,125-acre Tule Springs site, and Clark County owns the 825-acre southwest portion of the Clark

County Shooting Park that overlaps into the report area west of Decatur Boulevard. Although portions of adjacent areas have undergone rapid development in recent years, the large areas of land managed by the U.S. Fish and Wildlife Service, as well as the state and county-owned land, are likely to remain relatively stable and compatible with park values. There may be potential for partnerships between these governmental managing entities. Only 0.3% of the report area is privately owned land.

6.2.4 Current and Potential Uses of the Report Area and Surrounding Lands

Lands bordering the report area's southern edges primarily consist of privately owned residential developments in the cities of Las Vegas and North Las Vegas. All other lands surrounding the report area are administered by federal, state, and/or county governments, and this is not expected to change substantially in the future. Lands to the northwest and southeast ends of the report area are owned by Nellis Air Force Base, and public access is restricted. Nellis Air Force Base's military flight path crosses over the report area.

Powerline corridor

The U.S. Fish and Wildlife Service manages the large undeveloped area of land bordering the report area north boundary, and this land is open to public use. Exceptions are the Clark County Shooting Park that overlaps the report area's north boundary west of Decatur Boulevard and an 80-acre parcel of private land south of the Clark County Shooting Park that lies within the report area. The Las Vegas Paiute Indian Reservation's golf course is adjacent to U.S. Highway 95. Together, the U.S. Fish and Wildlife Service open space, Clark County Shooting Park, and the Indian reservation's golf course facilities comprise substantial recreational facilities adjacent to the report area.

Known rights-of-way that would need to be considered in a more extensive study include maintenance access to the area's flood control structures, powerline corridors, and roadways within or adjacent to the report area.

Any facilities constructed in the report area would need to be sensitive to the paleontological resources in the wash, as well as the wash's function as a floodplain.

6.2.5 Current and Potential Threats to the Resources

Of primary concern are the current condition and the continued protection of the exposed *in situ* paleontological resources. New construction of flood control features, utility corridors, and potential transportation corridors could lead to further degradation of the Las Vegas Wash and possibly impact fossil sites.

Vandalism, illegal dumping, and off-road vehicle use continue to be a problem in the report area. Costs associated with clean-up and remediation should be considered.

Illegal dumping

6.2.6 Costs Associated with Operation

Costs associated with land acquisition would be minimal because much of the report area consists of publicly owned lands administered by the Bureau of Land Management. The state owns the 1,125-acre Tule Springs site, and Clark County owns the southwest portion of the Clark County Shooting Park that is in the report area. Only a small percentage of the report area is privately owned land that could require acquisition.

Because of the abbreviated nature of this report, information on costs associated with acquisition, development, restoration, and operation is minimal. The costs for operation of some portion of the Upper Las Vegas Wash/Tule Springs report area as a unit of the national park system would depend on the nature of the park unit and the NPS management role (see section 6.4 below for a description of potential NPS roles). A range of feasible management options and an analysis of operational costs would be included in a special resource study.

A cost analysis should consider those costs associated with an active paleontology management program involving the preparation and curation of the fossils collected from the report area. These costs may be borne by the managing entity as a partner repositiory. Examples of such costs would include those for the collection storage equipment, materials and supplies, dedicated curation space, and staff time to prepare the fossils. Because fossils erode out of the wash at a regular rate, a paleontology resource management program and active field program will be required to collect these fossils to prevent their loss, which will result in active growth of a collection of specimens well beyond the 10,000 specimens. Although small animals will not consume much space, the presence of mammoths means that the collection facility will need to be large enough to accommodate the megafauna fossils as well.

6.2.7 Economic/Socioeconomic Impacts of Designation as a Unit of the National Park System

A preliminary assessment of local economic and socioeconomic impacts suggests that the designation of the Upper Las Vegas Wash/Tule Springs report area and the increased visitation and educational opportunities of a potential national park system unit could have a beneficial impact on the local economy overall. However, further analysis is required to investigate a variety of scenarios to more accurately quantify the economic and socioeconomic impacts of designation.

6.2.8 Level of Local and General Public Support

Public comment was beyond the scope of this reconnaissance report.

Members of the public have previously expressed their support for protecting resources in the Upper Las Vegas Wash/Tule Springs area. Some local and national nonprofit groups have publically expressed support for the area's inclusion in the national park system. Part of this support could be linked to general hope that the designation of a new NPS unit would help resolve the Las Vegas Valley's current economic problems.

6.3 Summary of Feasibility Findings

Although full development and analysis of these feasibility criteria is beyond the scope of this reconnaissance report, a preliminary finding indicates that including the report area in the national park system is likely feasible. A number of factors combine to lead the NPS team to believe that the addition of the Upper Las Vegas Wash/Tule Springs area as a separate unit of the national park system, or collaborative management with the National Park Service, for the purpose of preserving and interpreting the significant paleontological resources of the Las Vegas Wash may be feasible. The report area appears to be of sufficient size and appropriate configuration to ensure long-term, sustainable, resource protection and visitor enjoyment. The report area's urban interface is well situated for public access, and this provides an abundance of untapped potential for providing public enjoyment. However, this initial determination would greatly benefit from a full study of alternatives and would more fully examine site issues such as vandalism, unauthorized removal of fossils, and ORV use that may affect future options for management and protection of the area.

6.4 Potential NPS Role / Assistance

This reconnaissance report does not include the development or analysis of management options. However, the team has identified three potential management models that may be worthy of consideration for the Upper Las Vegas Wash/Tule Springs report area.

6.4.1 BLM Management

The Bureau of Land Management manages much of the land in the report area and is preparing an environmental impact statement on more than half of the area. As a result, the Bureau of Land Management has an in-depth understanding of the area, its resources, and its potential management opportunities and challenges. The Bureau of Land Management may be able to plan for resource protection as it continues to evaluate the impacts and potential boundaries of its disposal area. One possibility might include BLM management of the report area within its National Landscape Conservation System, which consists of 16 national monuments in 8 western states. These national monuments encompass landscapes of scenic beauty and a variety of important natural and cultural resources that are protected by the Bureau of Land Management at these sites. National Landscape Conservation Area designation would provide a greater level of administration and protection than current BLM management of the report area. Designation could include a higher level of resource protection; greater emphasis on visitor use, education, or interpretation; or higher levels of staffing.

6.4.2 NPS Management

The National Park Service has an established record of preserving and protecting natural and

cultural sites of exceptional national significance, including important paleontological resources. The National Park Service includes staff able to address visitor understanding and provide technical assistance for resource protection.

6.4.3 Collaborative Management

Collaborative management and administration between federal agencies, such as the Bureau of Land Management and the National Park Service, and/or with a state or local agency may also be a feasible way to protect the report area's significant paleontological resources. Each agency might have different roles, depending on their strengths and capabilities. An example of this partnership is the Santa Monica Mountains National Recreation Area, located northwest of Los Angleles, California. The recreation area is collaboratively managed by the National Park Service, California State Parks, the Santa Monica Mountains Conservancy, city and county governments, and private landowners. In this case, although it oversees the recreation area, the National Park Service only provides for the operation, maintenance, resource management, and resource and visitor protection of the 15% of the land that it owns outright (NPS 2002).

6.5 Conclusion

The report area's paleontological resources are significant and warrant protection. Based on available information, the National Park Service is unable to make a preliminary determination of the feasibility of including the Upper Las Vegas Wash/Tule Springs area in the national park system. The reconnaissance report found information in support of a favorable finding of feasibility, but the abbreviated nature of the survey does not provide adequately detailed information to be conclusive and provide the basis for the Secretary of the Interior to make recommendations about the area to Congress. A full special resource study would include extensive public involvement, explore the level of public support for different alternatives, determine whether appropriate resources are available for acquisition or other management approaches, and examine safety issues. The study would explore the feasibility of a range of management options as well as the funding and staffing required to carry out the protection of the significant resources within the report area.

7 RECOMMENDATION

The NPS team has conducted a preliminary analysis of resource significance and suitability and the feasibility of including the Upper Las Vegas Wash/Tule Springs report area in the national park system.

Based on the preliminary analysis, the Upper Las Vegas Wash/Tule Springs report area appears to be nationally significant. The resources also appear to be suitable for inclusion in the national park system. Further study and documentation would be needed to compare the resources of Upper Las Vegas Wash/Tule Springs to other similar areas that represent nationally significant resources of the late Pleistocene epoch. Preliminary findings also indicate that the report area is potentially feasible. However, this initial determination would benefit from a full examination of alternatives and feasibility criteria, including existing threats to resources, potential boundaries and management options, and the level of public support.

Based on these preliminary findings, the NPS team recommends that a special resource study be authorized for the Upper Las Vegas Wash/Tule Springs report area. The special resource study process should include extensive involvement of local landowners, government agencies, businesses, and nonprofit organizations to determine whether NPS involvement is desirable and feasible. Additional assessment will provide analysis of potential boundaries and management options.

Full moon over Las Vegas Valley – Photo courtesy of San Bernardino County Museum

8 APPENDICES

8.1 Appendix A. National Park Service Management Policies 2006 (Sections 1.2 and 1.3)

1.2 The National Park System

The number and diversity of parks within the national park system grew as a result of a government reorganization in 1933, another following World War II, and yet another during the 1960s. Today there are nearly 400 units in the national park system. These units are variously designated as national parks, monuments, preserves, lakeshores, seashores, wild and scenic rivers, trails, historic sites, military parks, battlefields, historical parks, recreation areas, memorials, and parkways. Regardless of the many names and official designations of the park units that make up the national park system, all represent some nationally significant aspect of our natural or cultural heritage. They are the physical remnants of our past — great scenic and natural places that continue to evolve, repositories of outstanding recreational opportunities, classrooms of our heritage, and the legacy we leave to future generations — and they warrant the highest standard of protection.

It should be noted that, in accordance with provisions of the Wild and Scenic Rivers Act, any component of the National Wild and Scenic Rivers System that is administered by the Park Service is automatically a part of the national park system. Although there is no analogous provision in the National Trails System Act, several national trails managed by the Service have been included in the national park system. These national rivers and trails that are part of the national park system are subject to the policies contained herein, as well as to any other requirements specified in the Wild and Scenic Rivers Act or the National Trails System Act.

1.3 Criteria for Inclusion

Congress declared in the National Park System General Authorities Act of 1970 that areas comprising the national park system are cumulative expressions of a single national heritage. Potential additions to the national park system should therefore contribute in their own special way to a system that fully represents the broad spectrum of natural and cultural resources that characterize our nation. The National Park Service is responsible for conducting professional studies of potential additions to the national park system when specifically authorized by an act of Congress, and for making recommendations to the Secretary of the Interior, the President, and Congress. Several laws outline criteria for units of the national park system and for additions to the National Wild and Scenic Rivers System and the National Trails System.

To receive a favorable recommendation from the Service, a proposed addition to the national park system must (1) possess nationally significant natural or cultural resources, (2) be a suitable addition to the system, (3) be a feasible addition to the system, and (4) require direct NPS management instead of protection by other public agencies or the private sector. These criteria are designed to ensure that the national park system includes only the most outstanding examples of the nation's

natural and cultural resources. These criteria also recognize that there are other management alternatives for preserving the nation's outstanding resources.

1.3.1 National Significance

NPS professionals, in consultation with subject-matter experts, scholars, and scientists, will determine whether a resource is nationally significant. An area will be considered nationally significant if it meets all of the following criteria:

- It is an outstanding example of a particular type of resource.
- It possesses exceptional value or quality in illustrating or interpreting the natural or cultural themes of our nation's heritage.
- It offers superlative opportunities for public enjoyment or for scientific study.
- It retains a high degree of integrity as a true, accurate, and relatively unspoiled example of a resource.

National significance for cultural resources will be evaluated by applying the National Historic Landmarks criteria contained in 36 CFR Part 65 *(Code of Federal Regulations).*

1.3.2 Suitability

An area is considered suitable for addition to the national park system if it represents a natural or cultural resource type that is not already adequately represented in the national park system, or is not comparably represented and protected for public enjoyment by other federal agencies; tribal, state, or local governments; or the private sector.

Adequacy of representation is determined on a case-by-case basis by comparing the potential addition to other comparably managed areas representing the same resource type, while considering differences or similarities in the character, quality, quantity, or combination of resource values. The comparative analysis also addresses rarity of the resources, interpretive and educational potential, and similar resources already protected in the national park system or in other public or private ownership. The comparison results in a determination of whether the proposed new area would expand, enhance, or duplicate resource protection or visitor use opportunities found in other comparably managed areas.

1.3.3 Feasibility

To be feasible as a new unit of the national park system, an area must be (1) of sufficient size and appropriate configuration to ensure sustainable resource protection and visitor enjoyment (taking into account current and potential impacts from sources beyond proposed park boundaries), and (2) capable of efficient administration by the Service at a reasonable cost.

In evaluating feasibility, the Service considers a variety of factors for a study area, such as the following:

- size
- boundary configurations
- current and potential uses of the study area and surrounding lands
- landownership patterns
- public enjoyment potential
- costs associated with acquisition, development, restoration, and operation
- access
- current and potential threats to the resources
- existing degradation of resources
- staffing requirements
- local planning and zoning
- the level of local and general public support (including landowners)
- the economic/socioeconomic impacts of designation as a unit of the national park system

The feasibility evaluation also considers the ability of the National Park Service to undertake new management responsibilities in light of current and projected availability of funding and personnel.

An overall evaluation of feasibility will be made after taking into account all of the above factors. However, evaluations may sometimes identify concerns or conditions, rather than simply reach a yes or no conclusion. For example, some new areas may be feasible additions to the national park system only if landowners are willing to sell, or the boundary encompasses specific areas necessary for visitor access, or state or local governments will provide appropriate assurances that adjacent land uses will remain compatible with the study area's resources and values.

1.3.4 Direct NPS Management

There are many excellent examples of the successful management of important natural and cultural resources by other public agencies, private conservation organizations, and individuals. The National Park Service applauds these accomplishments and actively encourages the expansion of conservation activities by state, local, and private entities and by other federal agencies. Unless direct NPS management of a studied area is identified as the clearly superior alternative, the Service will recommend that one or more of these other entities assume a lead management role, and that the area not receive national park system status.

Studies will evaluate an appropriate range of management alternatives and will identify which alternative or combination of alternatives would, in the professional judgment of the Director, be most effective and efficient in protecting significant resources and providing opportunities for appropriate public enjoyment. Alternatives for NPS management will not be developed for study areas that fail to meet any one of the four criteria for inclusion listed in section 1.3.

In cases where a study area's resources meet criteria for national significance but do not meet other

criteria for inclusion in the national park system, the Service may instead recommend an alternative status, such as "affiliated area." To be eligible for affiliated area status, the area's resources must (1) meet the same standards for significance and suitability that apply to units of the national park system; (2) require some special recognition or technical assistance beyond what is available through existing NPS programs; (3) be managed in accordance with the policies and standards that apply to units of the national park system; and (4) be assured of sustained resource protection, as documented in a formal agreement between the Service and the nonfederal management entity. Designation as a "heritage area" is another option that may be recommended. Heritage areas have a nationally important, distinctive assemblage of resources that is best managed for conservation, recreation, education, and continued use through partnerships among public and private entities at the local or regional level. Either of these two alternatives (and others as well) would recognize an area's importance to the nation without requiring or implying management by the National Park Service.

8.2 Appendix B. Composite Vertebrate Fauna, Las Vegas Formation

After Simpson (1933), Mawby (1967), J. N. McDonald (1981), H. G. McDonald (1996), Scott and Cox (2008), and Springer et al. (2009). Note: new additions to fauna in bold.

Animalia	
Chordata	
Osteichthyes	
Teleostei	
Perciformes	bony fish
Amphibia	
Anura	
Bufonidae	
Bufo sp.	toad
Hylidae	
Hyla sp. (large)	large frog
Hyla sp. (small)	small frog
Ranidae	
Rana sp.	**true frog**
Reptilia	
Chelonia	
Testudinidae	
Gopherus sp.	tortoise
Lacertilia	
Iguanidae	
Sceloporus sp. cf. S. *occidentalis*	sagebrush lizard
Callisaurus sp. cf. C. *draconides*	zebra-tailed lizard
Phrynosoma sp.	horned lizard
Anniellidae	
***Anniella* sp.**	**legless lizard**
Serpentes	
Colubridae	nonvenomous snakes
***Masticophis* sp.**	**coachwhip**
cf. *Arizona* sp.	**probable glossy snake**
Aves	

- Anseriformes
  - Anatidae
    - *Mareca americana* — widgeon
    - *Aythya collaris* — ring-necked duck
    - *Aythya affinis* — lesser scaup
    - *Mergus merganser* — common merganser
- Ciconiiformes
  - Teratornithidae
    - *Teratornis merriami* — extinct teratorn
- Accipitriformes
  - Accipitridae
  - Buteoninae — indeterminate soaring hawk
- Gruiformes
  - Rallidae
    - *Fulica americana* — coot
    - *Fulica americana minor* — extinct small coot
- Strigiformes
  - Strigidae
    - *Bubo* sp. — owl

Mammalia

- Xenarthra
  - Megalonychidae
    - *Megalonyx jeffersonii* — Jefferson's ground sloth
  - Nothrotheriidae
    - *Nothrotheriops shastensis* — Shasta ground sloth
- Lagomorpha
  - Leporidae
    - *Sylvilagus* sp. — cottontail rabbit
    - *Lepus* sp. — jack rabbit
    - *?Brachylagus idahoensis* — possible pygmy rabbit
- Rodentia
  - Sciuridae
    - *Ammospermophilus leucurus* — antelope ground squirrel
    - ***Marmota flaviventris*** — **yellow-bellied marmot**
  - Geomyidae
    - *Thomomys bottae* — Botta's pocket gopher
  - Heteromyidae
    - *Dipodomys* sp. (large) — large kangaroo rat
    - *Dipodomys* sp. (small) — small kangaroo rat
    - *Perognathus* sp. — pocket mouse
  - Cricetidae
    - ***Onychomys* sp.** — **grasshopper mouse**
    - *Peromyscus* sp. cf. P. *maniculatis* — deer mouse
    - ***Reithrodontomys* sp.** — **harvest mouse**
    - ***Neotoma* sp. cf. *N. lepida*** — **desert wood rat**
    - *Microtus* sp. cf. *M. californicus* — meadow vole
    - *Ondatra zibethicus* — muskrat
- Carnivora
  - Mustelidae
    - *Taxidea taxus* — badger
  - Canidae
    - *Canis latrans* — coyote
  - Felidae
    - *Felis* sp. cf. *F. concolor* — puma-sized cat
    - ***Lynx rufus*** — **lynx**
    - *Panthera atrox* — extinct North American lion
- Proboscidea

Elephantidae	
Mammuthus columbi	extinct Columbian mammoth
Perissodactyla	
Equidae	
Equus sp. (large)	extinct large horse
Equus sp. (small)	extinct small horse
Artiodactyla	
Camelidae	
Camelops sp.	extinct large camel
Cervidae	
Odocoileus sp.	deer
Antilocapridae	
?*Tetrameryx* sp.	extinct pronghorn
Bovidae	
Bison ?latifrons	extinct long-horned bison
Bison antiquus	extinct bison

9 REFERENCES

Bureau of Land Management (BLM)

2010a *Draft Supplemental Environmental Impact Statement, Upper Las Vegas Wash Conservation Transfer Area, Las Vegas, Nevada.* BLM Las Vegas Field Office.

2010b "Grand Canyon-Parashant." Available at http://www.blm.gov/az/st/en/ prog/ blm_special_areas/natmon/gcp.html (N.d. Accessed June 7, 2010).

Clark County, Nevada

2010 "Clark County Parks and Open Space: Wetlands Park." Available at http://www.accessclarkcounty.com/depts/parks/locations/Pages/wetlands.aspx (N.d. Accessed May 28, 2010).

City of Las Vegas

2010 "History."Available at http://www.lasvegasnevada.gove/FactsStatistics/history.htm (N.d. Accessed May 2010).

Fremd, Theodore

2009 Memorandum from Science Advisor (Paleontologist), National Park Service Pacific West Region, to National Park Service Regional Director, Pacific West Region. Subject: Las Vegas Wash Paleontological Locality Expanded Report.

Lake, Richard

2009 "Nevada Sees First Drop in Population Since 1910-20." *Las Vegas Review-Journal,* 12/31/09. Available at http://www.lvrj.com/news/nevada-sees-first-drop-in-population-since-1910-20-80403282.html?numComments=13 (Accessed June 14, 2010).

Las Vegas Sun

2010 "A Gamble in the Sun." Available at http://www.lasvegassun.com/history/ (N.d. Accessed May 27, 2010).

Mawby, J. E.

1967 "Fossil Vertebrates of the Tule Springs Site, Nevada." Papers Nevada State Museum Anthropology 13:105-128. Note: the specimens described by Mawby in the above paper are housed at the University of California Museum of Paleontology, Berkeley.

Mehringer, P. J., Jr.

1965 "Late Pleistocene Vegetation in the Mohave Desert of Southern Nevada." *Journal of the Arizona Academy of Science* 3(3):172-188.

National Park Service (NPS)

2002 *Final General Management Plan and Environmental Impact Statement: Santa Monica Mountains National Recreation Area, California.*

San Bernardino County Museum (SBCM)

2010 "Significance of Fossils from the Las Vegas Formation." Geological Sciences Division.

Shutler, R.

1968 "Tule Springs: Its Implications to Early Man Studies in North America." *Contrib. Anthropol. East. N.M. Unit.* 1(4):19-26.

Simpson, G.G.
1933 "A Nevada Fauna of Pleistocene Type and Its Probable Association with Man." *American Museum Novitates.* 667:1-10.

U.S. Environmental Protection Agency (EPA)
2010 "Particulate Matter (PM-10) Nonattainment Area/State/County Report." Available at http://www.epa.gov/oaqps001/greenbk/pnca.html (June 7, 2010; accessed June 14, 2010).

U.S. Forest Service
2006 "Humboldt-Toiyabe National Forest: Kyle Canyon Road." Available at http://www.fs.fed.us/r4/htnf/recreation/scenic_drives/kyle_canyon.shtml (Accessed June 14, 2010).

University of Nevada, Las Vegas (UNLV)
2010 "Historical Economic Data for Metropolitan Las Vegas," The Center for Business and Economic Research. Available at http://cber.unlv.edu/snoutlk.html (N.d. Accessed June 10, 2010).

10 PREPARERS

National Park Service Team Members and Reviewers

B.J. Johnson, Chief of Planning, Denver Service Center

Pat Kenney, Branch Chief, Denver Service Center

Greg Jarvis, Project Manager, Denver Service Center

Kate Randall, Landscape Architect, Denver Service Center

Carrie Schomig, Cultural Resource Specialist, Denver Service Center

Rory Westburg, Deputy Regional Director, Pacific West Region

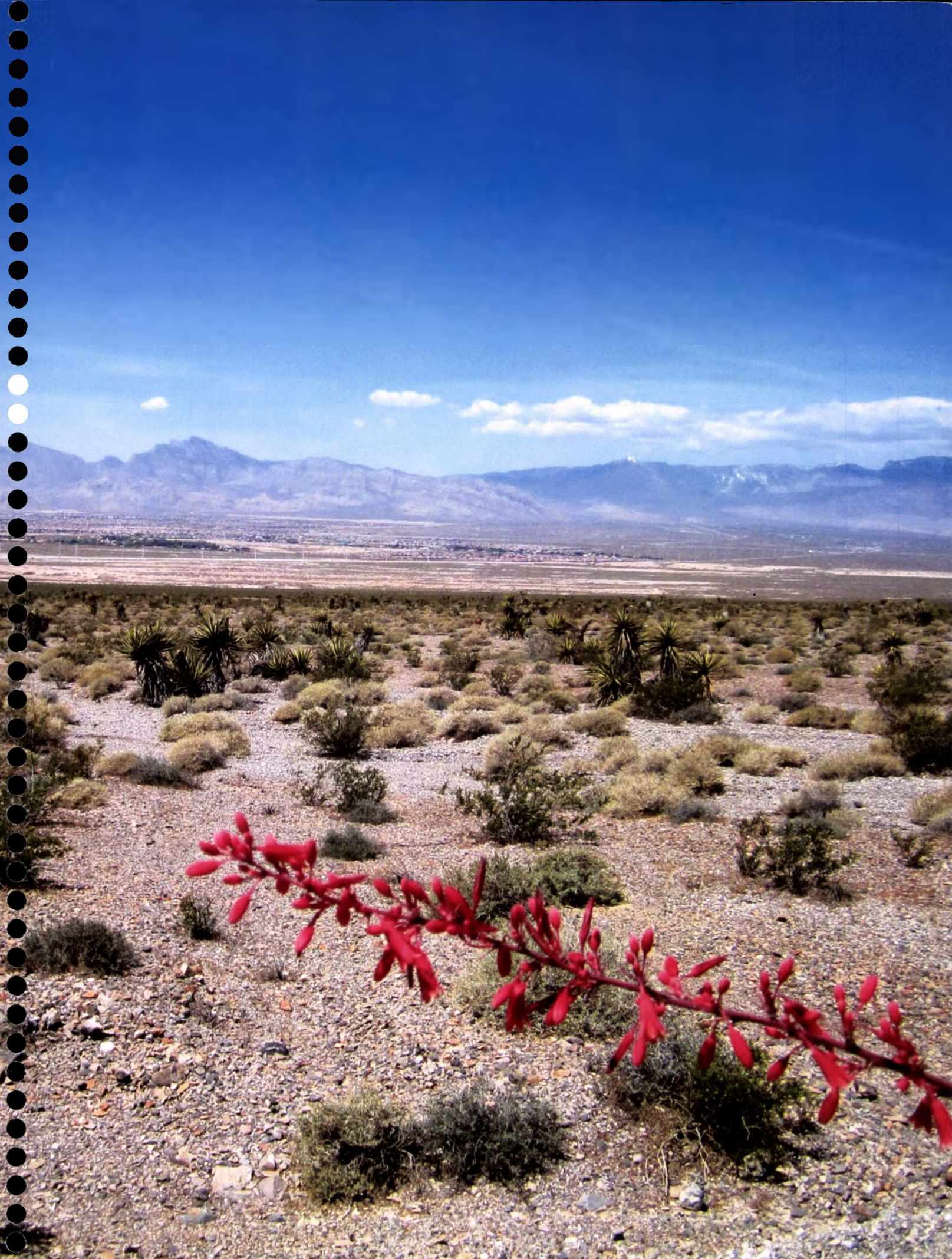
Keith Dunbar, Chief of Planning, Pacific West Region

Greg McDonald, Senior Curator of Natural History, Washington Office

Patrick Gregerson, Chief of Planning, Washington Office

Tokey Boswell, Program Analyst- Planning, Washington Office

Jim Ireland, Legislative Affairs, Washington Office



June 2010

National Park Service
U. S. Department of the Interior

Upper Las Vegas Wash / Tule Springs Reconnaissance Report

Horned lizard in Las Vegas Wash
June 3, 2010