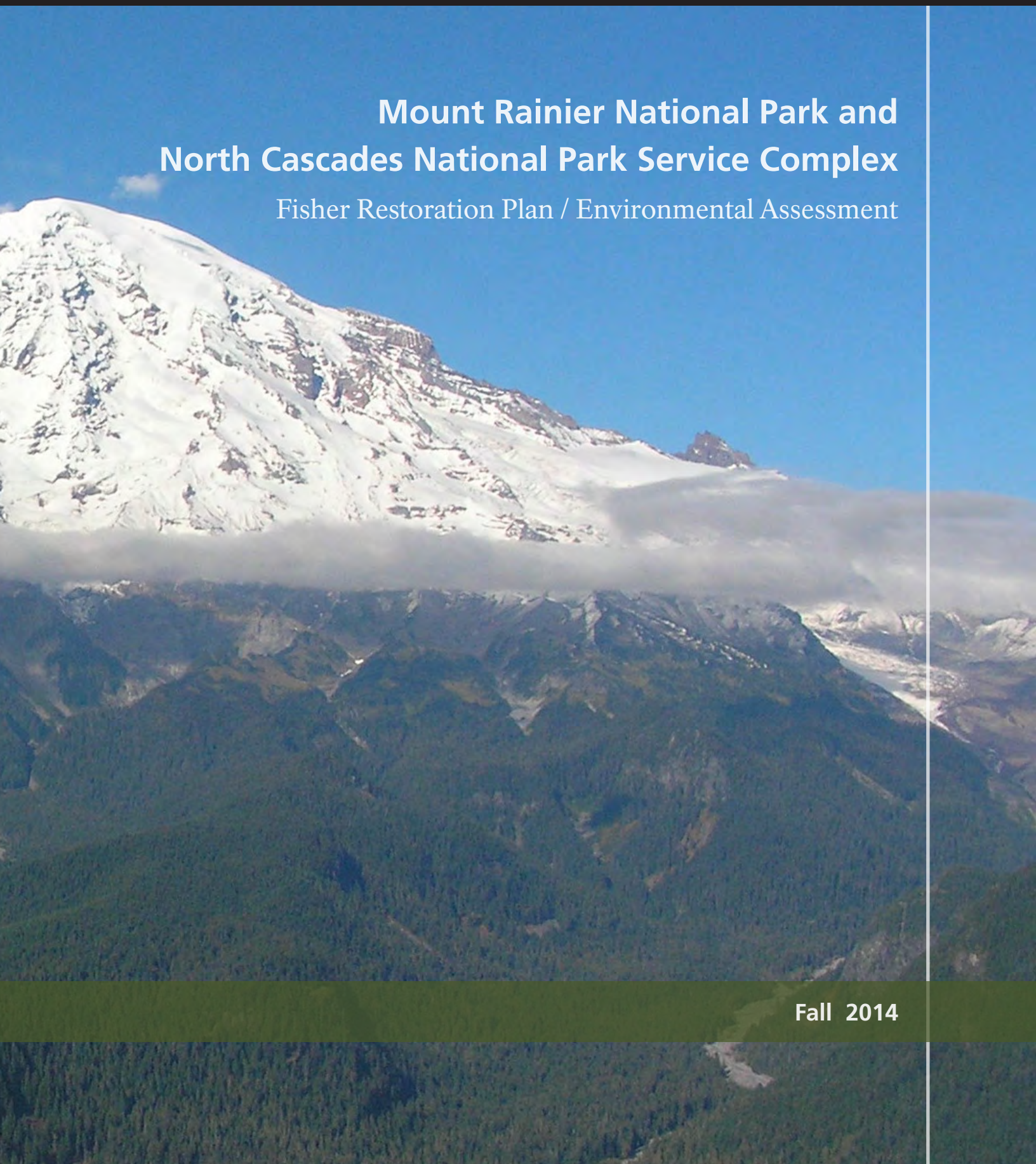
National Park Service
U.S. Department of the Interior
Mount Rainier National Park and North Cascades National Park Service Complex



# Mount Rainier National Park and North Cascades National Park Service Complex

## Fisher Restoration Plan / Environmental Assessment

Fall 2014

*Credit: J. Hoffman*

# Mount Rainier National Park and North Cascades National Park Service Complex

## Fisher Restoration Plan / Environmental Assessment

Prepared by:

Mount Rainier National Park
55210 238th Avenue East
Ashford, WA 98304

North Cascades National Park Service Complex
810 State Route 20
Sedro-Woolley, WA 98284

*Front Cover Photo: WDFW Photo by Tammy Schmidt*

# Summary

The National Park Service (NPS) is proposing to partner with the Washington Department of Fish and Wildlife (WDFW) to reestablish self-sustaining fisher (*Pekania pennanti*) populations in the southwestern and northwestern Cascades of Washington State, including Mount Rainier National Park and North Cascades National Park Service Complex, for the purpose of contributing to the statewide restoration of this state-listed endangered species. This proposed restoration will also improve ecosystem functions in the southwestern and northwestern Cascades and will enhance the natural quality of the Mount Rainier and Stephen Mather Wildernesses. Additional populations of fishers in the Pacific Northwest will also help sustain this species in the face of threats such as disease, habitat fragmentation, climate change, or other widespread ecological threats.

Extirpated from the Washington Cascades since at least the early 1990s, the fisher is not expected to return in ecologically meaningful abundance to the southwest and northwest Cascades without human intervention. As a result, WDFW identified three regions where successful fisher reintroduction is necessary for the species to be considered for downlisting in the state – the Olympic Peninsula (reintroduction occurred in Olympic National Park between 2008 and 2010), the southwestern Cascades, and the northwestern Cascades. Given the technical expertise and infrastructure that were created during the fisher reintroduction effort at Olympic National Park and the current, but not guaranteed future, availability of fishers from central British Columbia (the most suitable source population), the sooner fisher reintroductions can be implemented in the Washington Cascades, the more likely these efforts will be feasible and cost effective.

This *Fisher Restoration Plan/Environmental Assessment* (Plan/EA) evaluates two alternatives, the No Action Alternative and a Preferred Alternative. Specifics of the two alternatives are described below.

**Alternative A**, the No Action Alternative, continues with current management. The NPS would not partner with WDFW to restore fishers into Mount Rainier National Park or North Cascades National Park Service Complex. No NPS funding would be allocated to fisher restoration, and no fisher reintroductions would occur on NPS lands. However, the State of Washington would likely proceed with fisher restoration in the southwestern Cascades as outlined in WDFW's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (available at wdfw.wa.gov/publications/01556/), only no reintroductions would occur directly in Mount Rainier National Park. With a successful reintroduction, fishers would become distributed throughout the southwestern Cascades and may become established in Mount Rainier National Park over time.

**Alternative B**, the Preferred Alternative, is largely based on WDFW's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (available at wdfw.wa.gov/publications/01556/) and relies on the best available science to determine appropriate management actions. As articulated in the State's plan, fishers would be captured from a source population that is most closely related to that which historically occurred in the state (preferably from central British Columbia) and would be reintroduced into the southwestern and northwestern Cascades, including Mount Rainier National Park and North Cascades National Park Service Complex, over the course of a minimum of four years (two years of releases per reintroduction area) with monitoring immediately following release efforts. A founder population of at least 80 fishers, with a bias on adults and females, would be used for reintroduction efforts in each reintroduction area – 80 in the southwestern Cascades and 80 in the northwestern Cascades. The State and NPS have identified 16 candidate release sites in the two reintroduction areas (nine in the SW Cascades and seven in the NW

Cascades), based on the availability of suitable habitat and habitat connectivity. These sites include two in Mount Rainier National Park, the Nisqually River and Ohanapecosh, and three in North Cascades National Park Service Complex, the lower Thunder Creek drainage, the north fork of the Cascade River, and Ross Lake and Big Beaver Drainage. Under this alternative, fisher releases are likely to occur in each of these five reintroduction areas that are located in the parks. Fishers would preferably be released in the late fall / early winter to allow them to acclimate before winter, to establish home ranges, to locate suitable den sites before the birthing season, and to become aware of potential mates before mating season (approximately March 1- June 30).

The two alternatives are analyzed within this Plan/EA for their potential effects on natural and socio-cultural resources. These resources topics were selected based on the issues identified during internal and public scoping. The natural resource topics include species of special concern, wildlife and wildlife habitat, and the acoustic environment / soundscapes. Socio-cultural resources include wilderness; visitor use and experience; neighboring landowners, land uses, and socioeconomics; and park management and operations. Organized by resource topic, chapter 3 of this document describes the existing resource conditions (i.e. affected environment) and the environmental impacts to these resources (i.e. environmental consequences) associated with each alternative.

In accordance with NPS Director's Order 12, "Conservation Planning, Environmental Impact Analysis, and Decision-Making", the NPS is required to identify the "environmentally preferable alternative" in environmental documents, which is "the alternative that will promote the national environmental policy expressed in [the National Environmental Policy Act (NEPA)]" (Sec. 101(b)). According to the Council on Environmental Quality (CEQ), the environmentally preferable alternative is "the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (46 FR 18026 – 46 FR 18038). Both alternatives were evaluated to determine how well each met the goals from NEPA Section 101(b), and upon full consideration of this Act, Alternative B was found to be the environmentally preferable alternative for this Plan/EA.

## NOTE TO REVIEWERS AND RESPONDENTS

The public comment period for this Environmental Assessment will extend through October 15, 2014. We encourage you to review the document and welcome your comments. During the comment period, you may submit comments on-line, through the regular mail, or by hand delivery:

- **Submit Comments via the Project Website:** The most efficient way for the NPS to process comments is to receive them through the NPS Planning, Environment, and Public Comment (PEPC) project website (http://parkplanning.nps.gov/RestoreFisher). At the project website, you will find the full text document, an on-line comment form, and instructions for submitting on-line comments.
- **Submit Comments by Mail or Hand Delivery:** Comments may also be sent directly to: Superintendent's Office, North Cascades National Park Service Complex, 810 State Route 20, Sedro-Woolley, WA 98284.

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

# TABLE OF CONTENTS



## LIST OF FIGURES

## LIST OF TABLES

# Chapter 1 - Introduction

## PURPOSE AND NEED FOR ACTION

The National Park Service (NPS) is proposing to partner with the Washington Department of Fish and Wildlife (WDFW) to reestablish self-sustaining fisher (*Pekania pennanti*) populations in the southwestern and northwestern Cascades of Washington State (hereafter referred to as the SW and NW Cascades), including Mount Rainier National Park (MORA) and North Cascades National Park Service Complex (NOCA) (which includes North Cascades National Park and Ross Lake and Lake Chelan National Recreation Areas), for the purpose of contributing to the statewide restoration of this state-listed endangered species.

This action is necessary for the following reasons:

- The fisher, native to the SW and NW Cascades (including MORA and NOCA), has been extirpated from the region since at least the early 1990s and is currently a stated-listed endangered species and federally-listed candidate species (federal listing is for the West Coast Distinct Population Segment [DPS] of the fisher). This extirpation threatens the overall strength and resiliency of the species and has had a negative impact on the SW and NW Cascades ecosystems.
- The absence of fishers from MORA and NOCA also diminishes the wilderness character of the Mount Rainier Wilderness and Stephen Mather Wilderness which are located within and managed by these units of the national park system, respectively. This action is needed to help protect the wilderness character of both wildernesses.
- The fisher is not expected to return in ecologically meaningful abundance to the SW and NW Cascades without human intervention due to geographic isolation from source populations and biological factors such as limited reproduction and dispersal rates. As a result, Washington State has determined that fisher reintroduction is feasible and necessary in both the SW and NW Cascades to restore this species to its historical range in the state.
- MORA and NOCA, who collectively protect 917,325 acres of land in the heart of the SW and NW Cascades (94 percent of which is designated wilderness), are conservation anchors in the broader Cascades landscape. These NPS lands provide intact and suitable habitat for native species, including the fisher, and serve as a connectivity link between other lands with suitable habitat (NPS 2012c).
- Despite managing a substantial land base in the region, the NPS lacks the ecosystem-wide authority, resources, expertise, and expansive suitable fisher habitat to enable recovery of a self-sustaining fisher population without assistance from WDFW, and WDFW lacks the resources to facilitate fisher recovery in both ecosystems without substantial outside assistance. Considering land management authorities, funding needs, and the complexity of species reintroductions, an ecosystem-based partnership is essential to ensure recovery of this species in both the SW and NW Cascades.
- Recovery will help both the NPS and WDFW achieve their conservation missions and fulfill various agency mandates. Action towards recovery may also preclude federal listing under the ESA. This could conserve scarce federal resources to focus on recovery of other species.
- Action is needed now because the most suitable source population of fishers for the SW and NW Cascades (central British Columbia) may not be available in the future for translocation/reintroduction.

- The technical expertise and infrastructure that were created during the fisher reintroduction effort at Olympic National Park (OLYM), including a working relationship with contractors, veterinarians, and trappers in British Columbia (B.C.), will dissipate as time lapses between reintroductions. The sooner fisher reintroductions can be implemented in the SW and NW Cascades, the more likely these will benefit from that expertise and existing infrastructure.
- Additional populations of fishers in the Pacific Northwest will help sustain the species in the face of threats such as disease, habitat fragmentation, climate change, or other widespread ecological threats.

## Objectives

NPS regulations for implementing the National Environmental Policy Act (NEPA) define objectives as "what must be achieved to a large degree for the action to be considered a success" (NPS 2011). Objectives must also be measurable and consistent with, and even draw from, the enabling legislation, purpose and significance, and mission goals of the affected units of the national park system, as well as the direction and guidance provided in management documents of those units. The objectives of fisher restoration at Mount Rainier National Park and North Cascades National Park Service Complex are outlined in Table 1.1 below.

**Table 1.1: Objectives of Fisher Restoration in Mount Rainier National Park and North Cascades National Park Service Complex**

| Objective | Related Policy Guidance | Measure |
|---|---|---|
| 1. Establish self-sustaining fisher populations in both the SW and NW Cascades (i.e. populations that are capable of surviving and reproducing by natural means, without human intervention), and thereby contribute to Washington State recovery objectives for the fisher. | NPS *Management Policies 2006*, 4.4; *MORA General Management Plan*; *Ross Lake NRA General Management Plan*; *Washington State Recovery Plan for the Fisher* | Estimated survival rate, number of documented fishers that establish a home range, and number of documented reproducing females. |
| 2. Establish founding fisher populations genetically similar to the extirpated populations. | NPS *Management Policies 2006*, 4.4.2.2 | Presence of shared haplotypes of founding population with native Washington fishers based on best available information. |
| 3. Facilitate the distribution of fishers throughout suitable habitat in both Mount Rainier National Park and North Cascades National Park Service Complex. | *MORA General Management Plan*; *The General Management Plan and Environmental Assessment for NOCA* | Detections of fishers throughout suitable habitat in MORA and NOCA. |
| 4. Expand scientific understanding regarding habitat use, movement, reproduction and survival, and use such information to adaptively manage fisher restoration in the SW and NW Cascades and guide and inform future conservation efforts for fishers. | NPS *Management Policies 2006*, 4.2 | At least three years of monitoring completed in each reintroduction area. |
| 5. Educate the public about the fisher and restoration efforts, and inspire the public to become more involved in rare species conservation. | NPS *Management Policies 2006*, 4.4.1; *MORA Foundation Document*; *NOCA Foundation Document*; *Ross Lake NRA General Management Plan* | Aggregate number of public outreach opportunities developed and implemented to educate and engage the public about fishers, including events, programs, presentations, and publications. |

## Decision to be Made

The decision to be made is whether or not the NPS will partner with WDFW, through financial and logistical support and access to NPS lands, to establish fisher populations in the SW and NW Cascades of Washington State, including MORA and NOCA. WDFW may implement activities beyond the scope of this Plan/EA, on non-NPS lands in the Washington Cascades in accordance with the State's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (Lewis 2013) (see *Background* on page 3). This decision, however, is limited to NPS lands and does not address WDFW activities on non-NPS lands.

The NPS will decide to implement the No Action Alternative (Alternative A), the action alternative (Alternative B), or a modified version of the action alternative informed by comments received during public review of this Plan/EA. The selected alternative may also include additional mitigation measures or other conditions to minimize environmental impacts or risks. The selected alternative (of those listed above) will become the *Final Fisher Restoration Plan for Mount Rainier National Park and North Cascades National Park Service Complex*.

The decision to be made will be based on the recommendation from the superintendents at Mount Rainier National Park and North Cascades National Park Service Complex. The Pacific West Regional Director of the National Park Service is the deciding official.

## Project Area

The proposed reintroduction would occur within Mount Rainier National Park and North Cascades National Park Service Complex. Therefore, the analysis in this Fisher Restoration Plan/Environmental Assessment (Plan/EA) primarily focuses on these NPS units. Because fishers may travel to and use suitable habitats outside these units of the national park system, where the potential for impacts exists, the impact analysis also extends onto other adjacent lands with suitable habitat as identified by WDFW in their *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (Lewis 2013) (*Figure 1.1: Project Area*).

Mount Rainier National Park and North Cascades National Park Service Complex (which includes North Cascades National Park, Ross Lake National Recreation Area (NRA), and Lake Chelan National Recreation Area (NRA)) encompass a combined 918,081 acres (236,381 acres in MORA; 681,700 acres in NOCA) of the Cascade Range in Washington State. The park units, of which approximately 94 percent are designated wilderness (Mount Rainier Wilderness encompasses 97 percent, or 228,480 acres, of MORA; Stephen Mather Wilderness encompasses 94 percent, or 637,973 acres, of NOCA), are surrounded by a complex network of lands managed by federal, provincial, and state agencies; American Indian tribes; and private landowners (see *Figure 1.2: Mount Rainier National Park*, *Figure 1.3: North Cascades National Park Service Complex*, and *Neighboring Landowners, Land Use, and Socioeconomics* in *Chapter 3 - Affected Environment and Environmental Consequences*).

# BACKGROUND

The Pacific fisher (*Pekania pennanti*) is a medium-sized carnivore in the weasel family (*Mustelidae*). Found only in North America, this species has the build of a stocky weasel — a pointed face, rounded ears, a long and slender body, short legs, and a well-furred tail about one-third its total length (Lewis and Hayes 2004). Although similar in appearance to the more common American marten (*Martes americana*), the fisher is larger, has a darker pelage, and has a disproportionately longer tail than the marten. Female fishers weigh 4.4 – 5.5lbs, while the larger males weigh 7.7 – 12.1lbs (Powell 1993).

**Figure 1.1: Project Area**

Fisher Restoration Plan/Environmental Assessment

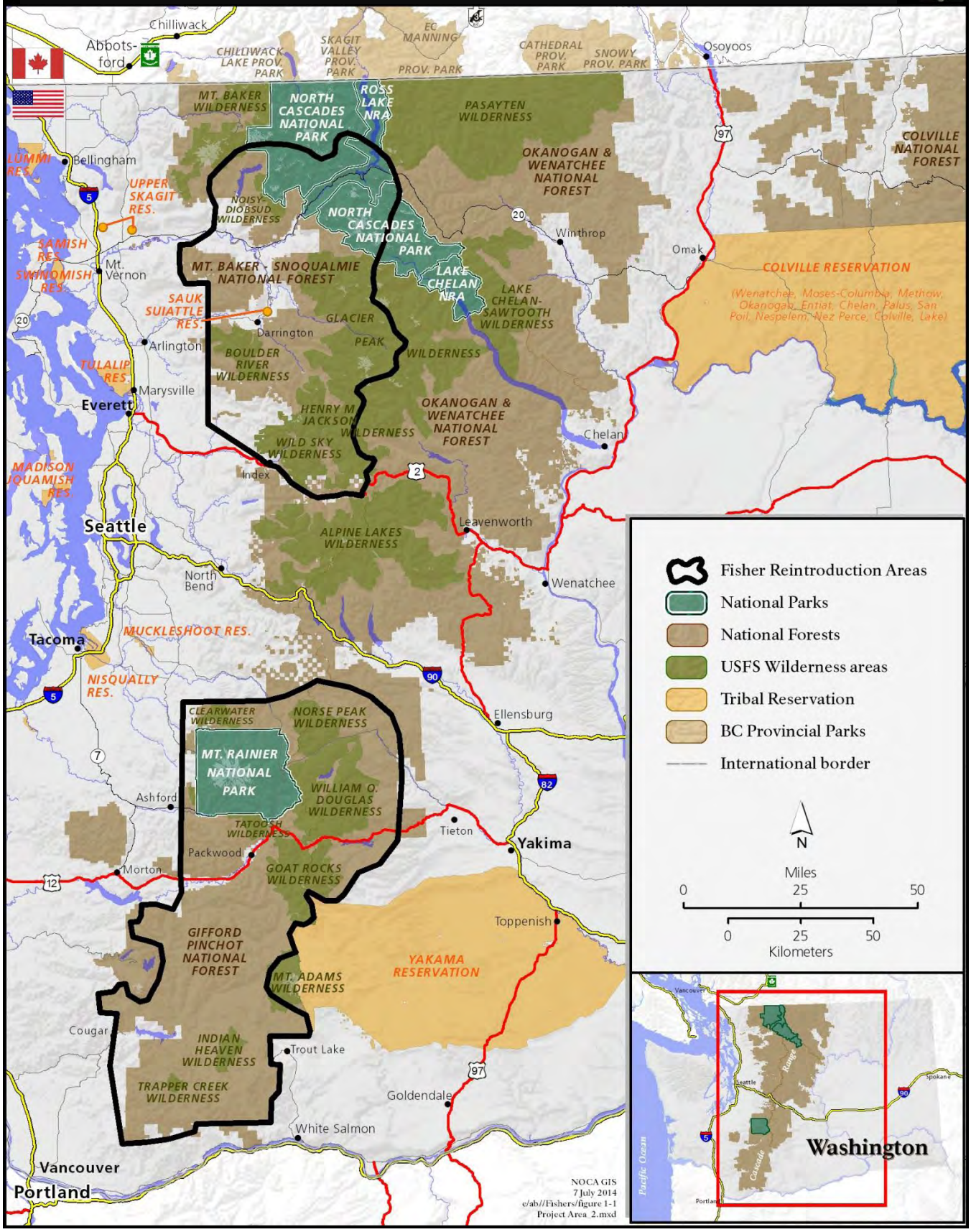


**Figure 1.2: Mount Rainier National Park**
Fisher Restoration Plan/Environmental Assessment

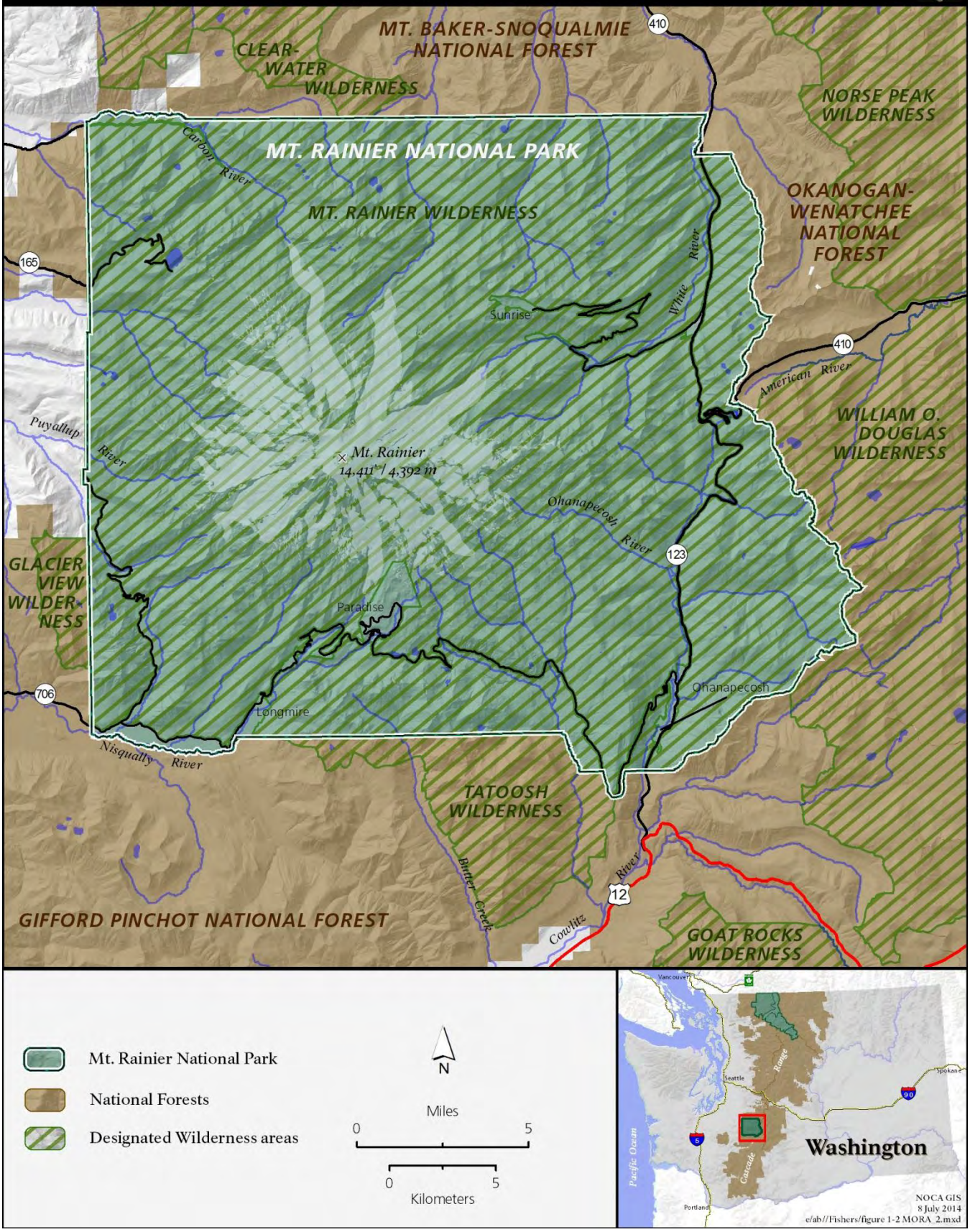
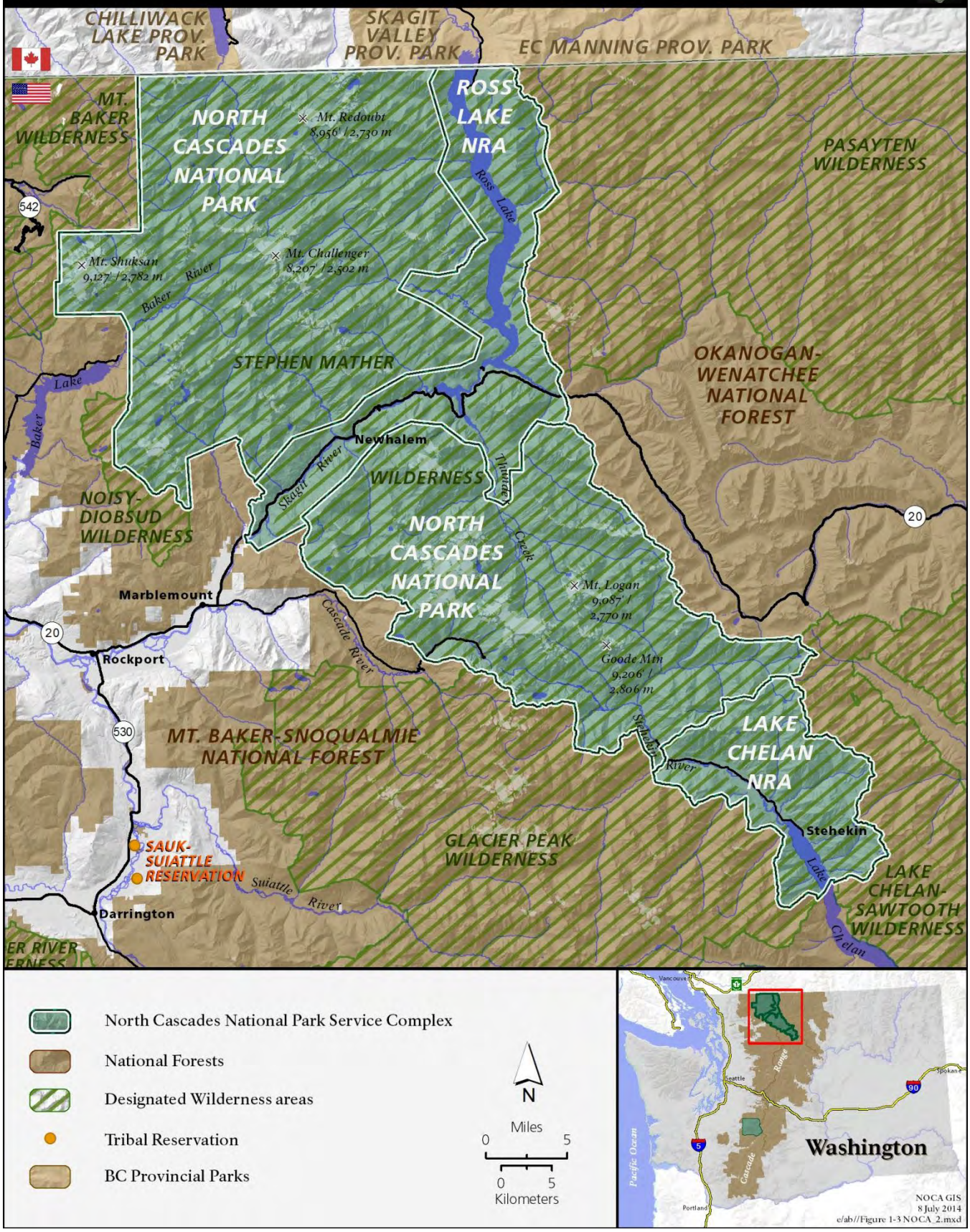


**Figure 1.3: North Cascades National Park Service Complex**
Fisher Restoration Plan/Environmental Assessment



Historically, fishers were found throughout much of the boreal and temperate forests of North America. Fishers are native to Washington, including MORA, NOCA, and OLYM. However, they were presumed extirpated throughout the state by the late 20th century due to the combined effects of over-trapping and habitat loss and fragmentation in low to mid-elevation coniferous forests (Aubry and Houston 1992, Lewis and Stinson 1998). Between 1990 and 2004, WDFW, the NPS, and U.S Forest Service (USFS) conducted extensive surveys throughout the historical range of the fisher in Washington to detect fishers as well as other forest carnivores. Despite these extensive efforts, no fishers were detected and no population was known to exist (Lewis and Stinson 1998, Aubry and Lewis 2003, Hayes and Lewis 2006, Christophersen et al. 2005, Christophersen 2006, Reid et al. 2010).

In the two parks, fishers have been considered extirpated from MORA since 1935, and were last documented via sightings/tracks in NOCA in 1989 (Lewis and Stinson 1998; Aubry and Houston 1992). Both parks receive occasional reports of fisher observations; however, none have been verified. The NPS completed a number of carnivore studies within MORA and NOCA to detect fishers and other carnivores between the 1980s and early 2000s. During the winters of 2000-2002, a parkwide survey to detect forest carnivores was completed at MORA using remote cameras (Reid et al. 2010). The methodology used was the same used to successfully detect fisher presence elsewhere (Zielinski and Kucera 1995), but despite 46 camera stations, 1571 camera nights, and photo documentation of seven of the forest carnivores, including American marten, no fishers were detected. From the summer of 1988 to the spring of 1992, park staff at NOCA conducted a vertebrate survey in the Stehekin Valley, but over the course of those four years no fishers were detected (Kuntz and Glesne 1993). Similarly, Christophersen et al. (2005) conducted a more targeted survey of forest carnivores in 2003 and 2004, using the same methodology as the MORA survey, and despite the 78 camera stations, 2,178 camera nights, and photo documentation of seven other forest carnivores, again, no fishers were detected.

As with the loss of any species, the extirpation of the fisher from its historical range is believed to have disrupted the structure and function of forest ecosystems in Washington State. Although the interacting roles of ecosystem members are not fully understood, mesocarnivores (e.g., fishers, bobcats, wolverines, coyotes, martens) are more diverse and occur at greater densities than larger carnivores (i.e., grizzly bears and gray wolves) and play an important role in regulating "the abundance and distribution of a variety of other species through predation and competition" (Lofroth et al. 2010, 77). The fisher also contributes to its ecosystem by functioning as a disperser of seeds and spores, as prey for other carnivores, as a host for parasites and pathogens, and as a contributor to nutrient cycling (Lofroth et al. 2010). In this capacity, the fisher provides a number of valuable ecological functions, and the reestablishment of fisher populations will help restore more fully functioning ecological processes within the forest ecosystems of the Washington Cascades.

The failure to detect fishers within their historical range in the state prompted the Washington Fish and Wildlife Commission to list the fisher as endangered in 1998. Moreover, due to the depleted status of the fisher throughout portions of its former range in Washington, Oregon, and California, the U.S. Fish and Wildlife Service (USFWS) listed the West Coast Distinct Population Segment (DPS) of the fisher as a federal candidate species in 2004 (USFWS 2004b). In March 2013, USFWS initiated a status review of the fisher for the West Coast DPS to evaluate the merits of listing under the ESA (USFWS 2013a). A proposed rule on the decision to list or not will be published by the USFWS by September 30, 2014; if a listing is proposed, a final rule for listing the fisher could be expected by the fall of 2015.

Under the *Washington State Recovery Plan for the Fisher* (Hayes and Lewis 2006), fishers will be considered for down-listing when self-sustaining populations are established in multiple locations,

including the Olympic Mountains and the SW and NW Cascades of Washington State. Long-term persistence of fishers in Washington would be accomplished by re-establishing a number of widely distributed, self-sustaining populations within suitable areas of their historical range. The reestablishment of multiple populations would lessen the risk of extirpation that could result from catastrophic or stochastic events such as catastrophic wildfires, volcanic eruptions, forest disease outbreaks, fisher disease outbreaks, or the genetic and demographic effects of small, isolated populations.

Because of the absence of nearby populations to naturally recolonize the state through immigration, the *Washington State Recovery Plan for the Fisher* concluded that reintroduction is the best way to restore fishers in three of the four recovery areas (Olympic Mountains and the SW and NW Cascades) (Hayes and Lewis 2006). A cooperative reintroduction program in the Olympic Mountains took place in 2008-2010, resulting in a small, reproducing population. However this population is too small and too isolated by unsuitable habitat to feasibly provide dispersers to the SW and NW Cascades in the foreseeable future (Hayes and Lewis 2006). There are no fisher populations known to exist in southern British Columbia or northern Oregon that could recolonize the Washington Cascades from the north or south (Lofroth et al. 2010). Fisher populations in Idaho or those that might emigrate from Idaho to the Selkirk Recovery Area in eastern Washington are not connected to the Cascades via suitable habitat.

WDFW's *Feasibility Assessment for Reintroducing Fishers to Washington* evaluated fisher habitat in the state and concluded that fisher reintroductions were feasible in the Olympic Mountains and the SW and NW Cascades (Lewis and Hayes 2004; available at: http://wdfw.wa.gov/publications/pub.php?id=00231%20). They found that factors that caused fisher extirpation in Washington are no longer significant threats and should not prevent successful reintroduction. Fisher trapping, which was likely the most significant factor contributing to the species' demise, has been prohibited by law since 1934 (and is not allowed in either MORA or NOCA), and body-gripping" traps (e.g., leg-hold traps), that fishers can be incidentally captured in, have been banned in the state since 2000 (Initiative 713; see RCW 77.15.194). There is also an adequate amount and distribution of fisher habitat. According to the Habitat Assessment completed as part of the *Feasibility Assessment for Reintroducing Fishers to Washington*, the Cascade Mountain Range (approximately 12.4 million acres) supports approximately 1.6 million acres of suitable fisher habitat, much of which is contiguous and not heavily dissected by state or federal highways, and Lawler et al. (2012) projects that under climate change projections, the fisher will experience small climate-driven range expansions in the Washington Cascades. About 1.1 million acres of suitable fisher habitat is found on the west side of the Cascade crest and makes up about 17 percent of the western Cascades ecosystem (Lewis and Hayes 2004:22-23). Furthermore, suitable source populations are currently available for reintroduction. While fisher populations in Alberta, California, and British Columbia are all genetically similar to fishers that historically occurred in Washington State, the B.C. population is the most suitable source population for reintroduction efforts in the Cascades due to genetic and habitat similarities, and based on conversations with officials from B.C., fishers are expected to be available for translocation / reintroduction from the province. That said, tighter protections may be placed on the B.C. fisher populations in the next few years due to changing natural and political conditions in the province, such as severe beetle kills and logging practices that are reducing suitable fisher habitat.

Between 2008 and 2010, OLYM and WDFW released 90 fishers into OLYM from British Columbia, thus completing the first phase of a landmark conservation measure to restore a self-sustaining population of fishers to Washington State. Monitoring of this effort, which is ongoing, has shown some initial indications of success, and the NPS, USGS, WDFW, and USFS hope to have a more definitive assessment of this success by 2016, after completing a cooperative monitoring project that began in 2013 (Lewis, pers.

comm., 2013b; Jenkins and Happe 2013). Following the reintroduction in OLYM, the SW and NW Cascades are considered the most suitable locations for subsequent reintroductions of fishers to the state (Lewis and Hayes 2004).

Having released fishers into OLYM, WDFW is shifting to the second phase of fisher recovery in Washington by planning a fisher reintroduction in the SW and NW Cascades, as identified in the recovery plan for fisher restoration. To this end, WDFW has identified suitable locations for potential fisher reintroductions in the Washington Cascades – which includes habitat in MORA and NOCA, procedures for monitoring fishers if and when reintroduced, and research opportunities following possible reintroductions. This information is outlined in their *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (available at wdfw.wa.gov/publications/01556/) (Lewis 2013). WDFW has asked the NPS for their assistance and participation in this reintroduction effort.

## POLICY AND PLANNING CONTEXT

### Federal Laws and Policies

The following federal laws, executive orders (issued by the president), regulations, and policies provide the basis and authority for this plan:

- National Park Service Organic Act of 1916
- National Environmental Policy Act (NEPA) of 1969, as amended
- Endangered Species Act of 1973
- Wilderness Act of 1964
- Washington Parks Wilderness Act of 1988
- National Park Service Management Policies (2006)

#### National Park Service Organic Act of 1916

By enacting the NPS Organic Act of 1916, Congress directed the U.S. Department of the Interior (DOI) and the NPS to manage units of the national park system "to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations" (16 USC 1).

#### National Environmental Policy Act of 1969, as amended

The National Environmental Policy Act (NEPA) requires all federal agencies to study the impacts of proposed actions on the environment of federal lands, to analyze alternatives to the actions, and to inform and seek input from the public on the proposed actions. Environmental consequences of the proposed action and alternatives to the proposed action are analyzed in detail to provide managers and the public adequate information in order to provide input and to make informed decisions. Compliance with NEPA is satisfied by this environmental assessment.

#### Endangered Species Act of 1973, as Amended

The Endangered Species Act requires all federal agencies to consult with the Secretary of the Interior on all projects and proposals having potential impact on federally endangered and threatened plants and animals. It also requires federal agencies to use their authorities in furtherance of the purposes of the Endangered Species Act by carrying out programs for the conservation of endangered and threatened species and to ensure that any agency action authorized, funded, or implemented is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat.

### Wilderness Act of 1964

The Wilderness Act of 1964 (16 USC 1131 et seq.) established a national wilderness preservation system, of federally-owned wilderness lands "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Agencies responsible for administration of designated wilderness are required by law to preserve these lands "for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness" (16 USC 1131). To honor and protect wilderness character, the Wilderness Act prohibits the construction of roads, buildings, and other man-made improvements, as well as the use of mechanized transportation in wilderness, unless necessary for administration of the wilderness. Therefore, all park management activities proposed within wilderness are subject to review, following the minimum requirement concept and decision guidelines in order to determine whether the proposed action meets the minimum requirement for administering the area, and if so, what the minimum tools are to complete the action. The minimum requirements analysis for this plan is included in Appendix B.

### Washington Parks Wilderness Act of 1988

In accordance with the *Wilderness Act of 1964*, the *Washington Parks Wilderness Act* (1988) designated as wilderness approximately 216,855 acres of MORA as the Mount Rainier Wilderness and approximately 634,614 acres of NOCA as the Stephen Mather Wilderness. An additional 5,226 acres of NOCA were also designated as potential wilderness under this Act, to be converted to wilderness upon the removal of non-conforming uses. Following the completion of the Ross Lake National Recreation Area General Management Plan, NOCA was able to administratively convert 3,359 acres of the 5,226 acres of potential wilderness to designated wilderness in 2012.

### NPS Management Policies

Park units are obliged to protect and strive to recover any federally listed species (NPS 2006b, sec. 4.4.2.3) and to manage state listed species in the same manner to the greatest extent possible. Specifically, where native plant and animal populations "have been extirpated by past human caused actions", *Management Policies 2006* direct the NPS to take action to restore species whenever all of the following criteria are met:

- "Adequate habitat to support the species either exists or can reasonably be restored in the park, and if necessary also on adjacent public lands and waters; once a natural population level is achieved, the population can be self-perpetuating";
- "The species does not, based on an effective management plan, pose a serious threat to the safety of people in parks, park resources, or persons or property within or outside park boundaries";
- "The genetic type used in restoration most nearly approximates the extirpated genetic type.
- The species disappeared, or was substantially diminished, as a direct or indirect result of human induced change to the species population or to the ecosystem"; and
- "Potential impacts upon park management and use have been carefully considered" (NPS 2006b, sec. 4.4.2.2).

When restoring these species, NPS *Management Policies 2006* further provide:

- "The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function" (NPS 2006b, Section 4.1.5).

- "The restoration of native plants and animals will be accomplished using organisms taken from populations as closely related genetically and ecologically as possible to park populations, preferably from similar habitats in adjacent or local areas" (NPS 2006b, Section 4.4.1.2). However "If needed, the policies allow restoration efforts to include confining animals in cages for captive breeding to increase the number of offspring for release into the wild or to manage the population's gene pool" (NPS 2006b, sec. 4.4.2.2).

NPS *Management Policies 2006* also direct parks to cooperate with states, tribal governments, and the USFWS to meet the NPS's commitments for maintaining or restoring native species in parks and to participate in cooperative conservation beyond park boundaries (NPS 2006b). Such cooperative actions that apply to this reintroduction plan include:

- Participating in local and regional scientific and planning efforts, identifying ranges of populations of native plants and animals, and developing cooperative strategies for maintaining or restoring these populations in parks.
- Developing data, through monitoring, for use in animal management programs.
- Presenting information about species life cycles, ranges, and population dynamics in park interpretive programs for use in increasing public awareness of management needs for all species that occur in parks.

## Related Plans and Guidance

Park planning documents that are relevant to these proposed fisher restorations include those described below.

### National Park Service Plans for Mount Rainier and North Cascades National Parks

#### *Mount Rainier National Park Foundation Document (Draft, 1 August 2014)*

*Mount Rainier's Foundation Document* identifies "Biological diversity that contributes to the integrity of the Cascade ecosystem" and "Mount Rainier Wilderness values and experiences" as fundamental resources and values of the park based on the park's significance as:

- "a vital remnant of the once widespread primeval Cascade ecosystem and provides habitat for many species representative of the region's flora and fauna";
- a landscape that "protects over 97% of its area as federally designated Wilderness"; and
- "a living laboratory that offers opportunities for scientists and students to study and develop a deeper understanding of, as well as foster an appreciation for, the park, its resources, processes, and meanings."

#### *Mount Rainier National Park General Management Plan*

The *Mount Rainier National Park General Management Plan* outlines goals for resource stewardship (restore natural resources within their broad ecosystem) and guiding management principals and strategies for ecosystem management and the protection and management of natural resources. These guiding principles and strategies emphasize the importance of collaboration and partnerships in managing resources across political boundaries and identify the need to protect, study, and manage the park's natural resources and processes for achieving the park's purposes and mission.

Under the guidance of the General Management Plan, Mount Rainier National Park will:

- "continue to work with the Washington Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service to ensure that the National Park Service's actions help special-status species to recover"; and
- "cooperate with the above agencies in inventorying, monitoring, protecting, and perpetuating the natural distribution and abundance of all special status species (i.e., state and federally listed threatened, endangered, rare, declining, sensitive, candidate, or special concern species) and their essential habitats in Mount Rainier National Park" (NPS 2001, 22-23).

***Mount Rainier National Park Wilderness Management Plan***

Approved in 1989, the *Wilderness Management Plan for Mount Rainier National Park* identifies goals for wilderness management and standards for wildlife resources in the Mount Rainier Wilderness. Goals related to the proposed action include managing "the Wilderness as a distinct resource with inseparable parts," managing "the use of other resources and activities within Wilderness in a manner compatible with Wilderness," and allowing "natural processes to operate freely within Wilderness" (NPS 1989, 17).

Within the standards for managing wildlife resources, the plan specifically states that "Extirpated (indigenous) species may be introduced into the Wilderness, subject to NPS policies pertaining to wildlife" (NPS 1989, 59).

***Mount Rainier National Park Fire Management Plan***

The Fire Management Plan for MORA relates to fisher reintroduction in that it outlines goals and management strategies for managing forests in the park that often provide habitat for fisher. Two goals of this plan that relate to fisher restoration are: "Restore and maintain natural fire regimes to the maximum extent practicable to ensure unimpaired natural ecosystem functioning" and "Protect natural resources (including flora, fauna, air quality, geologic resources, aquatic resources and wilderness character) from adverse effects of unwanted wildland fires, fire suppression, use fire, prescribed fires, and manual/mechanical treatments" (NPS 2005a, 32-33).

***North Cascades National Park Service Complex Foundation Document***

Of those resources that make the North Cascades National Park Service Complex nationally significant, the following significance statements identified in NOCA's Foundation Document relate to the reintroduction of the fisher in NOCA.

- "From deep forested valleys to alpine peaks, the North Cascades National Park Service Complex encompasses extreme gradients of climate and topography that contribute to an impressive diversity of habitats and species. This area is the core of a vast mountainous ecosystem of protected public lands spanning the border of the United States and Canada. The ecological integrity of the North Cascades National Park Service Complex and the greater North Cascades ecosystem depend on one another" (NPS 2012a)
- "Envisioned as a wilderness park from its inception, the North Cascades National Park Service Complex is part of more than 2 million acres of federally designated wilderness, which is one of the largest such areas in the lower 48 states. The North Cascades wilderness, along with adjacent wilderness areas, is maintained to preserve and enhance the qualities of wilderness character" (NPS 2012a).
- "North Cascades National Park Service Complex provides educational and scientific opportunities that support the understanding and preservation of park resources and values while contributing to public enjoyment and understanding" (NPS 2012a)

### *General Management Plans for North Cascades National Park Service Complex*

Three general management plans guide park management decisions for North Cascades National Park and Lake Chelan and Ross Lake National Recreation Areas.

The *General Management Plan and Environmental Assessment for North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Recreation Area*, which now applies solely to North Cascades National Park, states that "the entire complex will be managed as an integral part of a regional ecosystem encompassing a broad range of local plant and animal communities" and "Specific studies or protection programs will be initiated to guide management of federally protected or sensitive species" (NPS 1987, 37).

The *Lake Chelan National Recreation Area General Management Plan* further confirms NOCA's commitment to protecting rare, threatened, and endangered species, stating "The National Park Service would educate and cooperate with private landowners and other agencies…to encourage use of native species…[and] would work with the USFWS and other agencies to define and properly manage important habitats in an ecosystem context" (NPS 1995a, 27).

Finally, the *Ross Lake National Recreation Area General Management Plan* includes a number of guiding principles/objectives for protecting rare, threatened and endangered species, which include:

- "Federally-listed and state-listed threatened and endangered species and their habitats are protected and sustained.
- Native threatened and endangered species populations that have been severely reduced in or extirpated from the unit are restored where feasible and sustainable.
- Threatened, endangered, or otherwise imperiled species…show increasing trends in their population, leading to improvement in the species' status and ultimately, to recovery. State and federally listed wildlife populations are stable or increasing, as measured by recovery goals outlined in the species recovery plans required for all listed species.
- Habitats that support or are suitable for sensitive, rare, endemic, or listed species are protected.
- Visitors learn about species…that are listed under the Endangered Species Act as well as actions that may assist their recovery" (NPS 2012b, 42).

The plan also asserts that "In cases where resources have been impacted, the NPS will seek appropriate restoration to maintain the integrity of the North Cascades ecosystem" and "priority will…be given to performing this work through long-term sustainable partnerships" (NPS 2012b, 77-78).

### *North Cascades National Park Service Complex Fire Management Plan*

The Fire Management Plan for NOCA relates to fisher reintroduction in that it outlines goals and management strategies for managing forests in the park that often provide habitat for fishers. The second goal of this plan is to "Allow the natural process of fire to prevail in the Complex", which is supported by the management objectives to "Manage ecosystems to preserve the natural range of variability in processes and structure" and "Minimize adverse impacts to threatened, endangered, and sensitive species and their habitats" (NPS 2005b, 10).

## U.S. Forest Service Guidance for Adjacent Federal Lands

### *Northwest Forest Plan*

The *Northwest Forest Plan*, which applies to 24 million acres of USFS and Bureau of Land Management (BLM) lands in Oregon, Washington, and California, provides an overall vision for the Pacific Northwest

that emphasizes producing timber products while protecting and managing impacted species. Initiated in 1993 to end the impasse over the management of federal forest lands within the range of the northern spotted owl, the *Northwest Forest Plan* now provides a framework and system of standards and guidelines, using a new ecosystem approach, to address resource management.

The plan focuses on five key principles (REO 2014): 1) Never forget human and economic dimensions of issues; 2) Protect long-term health of forests, wildlife, and waterways; 3) Focus on scientifically sound, ecologically credible, and legally responsible strategies and implementation; 4) Produce a predictable and sustainable level of timber sales and non-timber resources; 5) Ensure that federal agencies work together.

To support this framework, the plan included a program for managing the forests to achieve both sustainable timber production and protection of biological diversity, a system for coordinating federal agency implementation of the forest management effort and receiving advice from nonfederal interests (formalized in a memorandum of understanding that was signed by a number of federal agencies, including the NPS, in 2003), and an initiative for providing economic assistance and job retraining to displaced timber workers, communities, and others who were adversely affected by reductions in the size of the timber program (REO 1998).

### State and Provincial Laws, Regulations, and Policies

#### *Washington Department of Fish and Wildlife (WDFW)*

The mission of WDFW is to "serve Washington's citizens by protecting, restoring and enhancing fish and wildlife and their habitats, while providing sustainable and wildlife related recreational and commercial opportunities." To this end, the department is mandated "to preserve, protect, perpetuate, and manage the wildlife and food fish, game fish, and shellfish in state waters and offshore waters" which includes the critical role of overseeing the listing and recovery of threatened and endangered species in Washington, including the fisher (WDFW 2004). Since the fisher's listing as a state endangered species in 1998, WDFW has completed a recovery plan for the fisher, a feasibility assessment for reintroducing fishers to Washington, and two implementation plans for reintroducing fishers to Washington – one for the Olympic Recovery Area and one for the SW and NW Cascades Recovery Areas, on which this Plan/EA is based.

#### *Washington Department of Agriculture (WDOA)*

Within its broad scope of duties, the Washington Department of Agriculture (WDOA) protects "Washington State's natural resources, agriculture industry, and the public from selected plant and animal pests and diseases." To this end, WDOA requires the completion of a health certificate and issuance of a permit before entry of fishers into Washington.

#### *Permits Required to Transport Animals across International Borders*

The Canadian government does not require any federal permits for exporting fishers, and the U.S. government does not require disease testing of fishers or health certificates to transfer fishers from Canada to the U.S. The provincial governments of British Columbia and Alberta require a "Possession Permit" for the transport of fishers within the province and out of Canada. However, if rabies is documented in any wild carnivore (including fishers) from the state of origin in the 12 months prior to translocation, it would not be allowed entry into Washington. The USFWS also requires fishers to be inspected by a USFWS inspector at the international border and that the animals be "declared" (Declaration Form 3-177) several days prior to state entry. WDOA also requires completion of a health certificate and the issuance of a permit prior to the entry of fishers into Washington (Lewis 2006).

## PROJECT PLANNING AND SCOPING

NEPA regulations require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (NPS 2011). To determine the scope of issues to be analyzed in depth in this plan, the planning team for this Plan/EA completed both internal scoping with NPS staff and external scoping with the public in 2013 which are fully described in *Chapter 4: Consultation and Coordination.*

## ISSUES AND IMPACT TOPICS

Issues are potential environmental problems that may result from federal action, if it is taken. Issues were identified by specialists with the National Park Service, Federal Highway Administration, and by the public during scoping. Once issues were identified, they were used to help formulate the action alternative and mitigating measures. Impact topics were then selected for detailed analysis based on substantive issues; environmental statutes, regulations, and executive orders; and NPS *Management Policies 2006*. A summary of specifics and rationale for their selection are given below.

### Impact Topics Selected for Detailed Analysis

Several issues were identified as requiring further analysis in this Plan/EA. These issues, presented below, represent existing concerns, as well as concerns that might arise during consideration and analysis of alternatives, and form the basis for the affected environment and impact topics analyzed in *Chapter 3: Affected Environment and Environmental Consequences.*

**Species of Special Concern (Animal)**

- Approximately fifteen federally-listed and 34 state-listed animal species (endangered, threatened, candidate, and other species of concern) occur in MORA and NOCA. Due to competition, disease, and predation, alternatives analyzed in this plan could have some impact on special status species, including the northern spotted owl (*Strix occidentalis caurina*), marbled murrelet (*Brachyramphus marmoratus marmoratus*), Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and grizzly bear (*Ursus arctos*).
- In addition, reintroducing fishers would have a beneficial effect on the species itself by creating additional populations in Washington State and contributing to long-term recovery goals.

**Wildlife and Wildlife Habitat**

- As the extirpation of the fisher from its historical range is believed to have disrupted the structure and function of forest ecosystems in Washington State, the proposed action would help to at least partially restore functioning ecological processes, such as interspecies competition, within the forest ecosystems of the Washington Cascades. See *Background* on page 3 for more information on how the fisher contributes to ecosystem functionality.
- Fishers use similar forest types and prey as other mid-sized carnivores in MORA and NOCA, including the American marten, bobcat, coyote, and Cascade red fox. Thus, there is potential for fishers to affect these species through competition for forest cover and prey.

**Wilderness**

- Fisher reintroduction could have a beneficial impact on wilderness character by restoring native species and by restoring ecosystem functions within MORA and NOCA and the surrounding areas, thus having a beneficial impact on the "natural" quality of wilderness character.

- Any actions needed to reestablish the fisher, such as radio-collaring for monitoring purposes, and potentially using mechanized equipment to facilitate reintroduction and monitoring, would adversely affect the untrammeled and undeveloped qualities of wilderness character.

**Acoustic Environment / Soundscapes**

- Actions needed to reestablish the fisher, such as the use of aerial telemetry flights for monitoring purposes, could adversely affect the acoustic environment in MORA and NOCA.

**Visitor Use and Experience**

- Fisher reintroduction could beneficially affect visitor experiences in MORA and NOCA by enhancing opportunities to experience a rare, forest dwelling species in a national park and wilderness setting.
- As both parks are known for their ecosystem diversity, fisher reintroductions could beneficially impact visitor experiences because visitors would know that a missing component of the ecosystem had been restored.
- Fisher reintroductions would also increase interpretative opportunities to enhance visitor experiences in both parks.
- As a state-listed species, fisher reintroductions may require area closures or other short-term constraints on public use of the parks to enable successful release and establishment of a founding population. However, fishers are not expected to den in locations of high visitor use, reducing the likelihood of impacts to visitors.

**Neighboring Landowners, Land Use, and Socioeconomics**

- Impacts to "neighboring landowners, land use, and socioeconomics" from proposed fisher reintroductions are tied primarily to logging and the timber industry. As a state-listed species, it is possible that restrictions could be placed on landowners in order to protect fishers and their habitat, particularly if the land is used for resource extraction, such as timber harvesting. For example, seasonal buffer zones from mechanized activity around known active den sites may be required on neighboring USFS lands to protect fishers. While these restrictions could temporarily impact landowners, the likelihood of a fisher using a forest stand that is subject to harvest is low as fishers are closely associated with late successional forests (which are most commonly found on USFS and NPS lands and are protected from harvest under current conditions).
- If fishers are released on NPS lands and individuals migrate to adjacent lands, private landowners could be beneficially impacted from fisher predation on mountain beaver (a.k.a. ground bear or giant mole) and porcupines, which can damage commercial trees and seedlings.
- Fisher biologists and furbearer program managers have documented occurrences of fisher predation on pets and poultry in the Midwest and Northeast, particularly near homes that are in remote settings in forested habitats. While local residents of the SW and NW Cascades could experience fisher predation on small domestic animals or livestock, especially if they are not confined, this is likely to be less common than predation from more common predators (e.g., coyote, bobcats, raccoons).

**Park Management and Operations**

- Restoration of fishers on NPS lands would require funding and personnel resources to implement initial restoration actions and conduct associated monitoring programs. These actions would impose an operational and financial burden on the parks and could require diversion of resources away from other priorities due to current and projected budgetary shortfalls in the agency.

## Impact Topics Dismissed from Detailed Analysis

If an issue was considered to be outside the scope of this environmental assessment, or if the best available information indicated that the proposal would have no effects or negligible effects, it was eliminated for further analysis, as per NEPA requirements. The following topics have been dismissed from detailed analysis. A brief rationale for dismissal is provided for each topic. Potential impacts on these resources would be none or negligible and most likely immeasurable.

**Air quality.** The monitoring of released fishers could involve the use of aircraft, which could affect air quality. However, such an increase in aircraft use would be negligible and would not impact overall air quality in the parks.

**Vegetation (Including Rare, Unusual, and Species of Special Concern).** Fisher reintroduction would not likely impact vegetation, including rare or unusual vegetation, at MORA or NOCA because fishers are not herbivorous and fisher predation on herbivores is not expected to have secondary, indirect effects on vegetation. Although fruit (such as huckleberries) could become a more important part of the fisher's diet during fall and winter, any seasonal forage would have short-term, negligible, adverse impacts on individual plants, but would not affect the plant communities overall.

**Aquatic Species.** Fisher reintroduction is not likely to impact aquatic resources, including rare or listed species, or their habitat at MORA or NOCA because fishers are not known to be pisciverous.

**Wildlife – Introduction of Pathogens/Non-Native Species.** Fishers are susceptible to a number of diseases that affect other wildlife species, but disease is not a major mortality factor in fisher populations (Lewis and Hayes 2004). Furthermore, WDFW would check and treat individual fishers for fleas, ticks, endoparasites, distemper, and rabies, and each fisher would be inspected and certified as suitable for release by a licensed veterinarian prior to release under standard protocols. Therefore, it is unlikely that an individual fisher translocated to the Washington Cascades would be a disease vector through the proposed action.

**Wildlife – Effects on the B.C. Source Population.** Although the proposed action would result in the relocation of 160 fishers from British Columbia (B.C.), harvests would be managed under existing Provincial seasons and harvest limits to ensure protection of this population, and it is assumed that capturing fishers for translocation to Washington would be largely compensatory for fishers that would have been harvested for their pelts rather than resulting in additional fisher mortality. Similarly, during the reintroduction in OLYM, when 90 fishers were relocated from British Columbia to the Olympic Peninsula, fisher harvests did not increase in the province; in fact, fisher harvests were lower than the years prior to and following the reintroduction (Weir, pers. comm., 2014).

**Floodplains or Wetlands.** No occupancy, modification, or development of floodplains is expected under this plan. It is possible that fishers could prey on beavers, which could have an indirect effect on wetlands. However, considering the estimated low density beaver population in both MORA and NOCA, and the insignificant role beavers play in the fisher diet, it is believed that potential fisher predation on beaver in the SW and NW Cascades would not have a measurable indirect impact on wetland functions.

**Museum Collections.** Although there is a possibility that fisher mortalities could contribute taxidermy specimens to the museum collections at either MORA or NOCA, this would result in virtually no impact to park operations or the museum collection because it would not noticeably increase the volume of records archived.

**Recreational Resources – Food Storage Regulations.** Because larger predators and other mammals are present in both MORA and NOCA and current visitor use management regulations require proper food storage for all backcountry users based on these species, backcountry use regulations would not change in either park due to fisher reintroduction.

**Socioeconomics – Tourism.** It is possible that tourism in the area could increase due to perceived benefits on the part of visitors as a result of fisher reintroduction, which could benefit local businesses. However, such an increase would likely be slight and difficult to quantify. Therefore, impacts from increased tourism were dismissed from further analysis.

**Socioeconomics – Non-Timber Forest Harvesting.** While MORA allows extremely limited harvest of non-timber resources by Native Americans, all harvesting is prohibited in NOCA. Fisher reintroduction would not impact non-timber forest harvesting activities, within or outside of these units of the national park system as these harvested resources are not critical to fisher survival and would not require any restrictions to protect fisher. While it is possible that fisher listing could result in temporary access restrictions to harvesting areas, any restrictions would be associated with a denning female and would be negligible as denning occurs during the spring when most harvest activities aren't occurring. Any potential restrictions on public access to federal lands are analyzed under *Visitor Use and Experience* in chapter 3.

**Socioeconomics – Hunting and Trapping.** Fisher trapping has been prohibited in Washington State since 1934, and "body-gripping" traps that can injure or incidentally capture fishers have been banned in the state since 2000 (Initiative 713; see RCW 77.15.194). Hunting and trapping are also prohibited in MORA and North Cascades National Park; however, these activities are allowed in Ross Lake and Lake Chelan National Recreation Areas (NRAs) and within the surrounding national forests under the management of and regulations established by WDFW. While there would be no additional restrictions on hunting or trapping under this proposed action, it is possible that a short-term restriction could be placed on access to a specific hunting and trapping area within or near the NRAs and/or forest lands in order to protect a known den site. However, the occurrence of these restrictions would likely be rare and would have minimal impact on hunters and trappers because 1) there is little overlap between hunting and trapping seasons with the fisher denning period,[1] 2) there is minimal demand for what hunting and trapping activities are allowed during the denning period,[2] and 3) short-term restrictions to protect den sites would occur only while the active monitoring program is ongoing (three to four years), when fishers have functioning radio-transmitters. Therefore, impacts to hunters and trappers would be no more than negligible from the proposed action, and this topic was dismissed from further analysis.

**Urban Quality/Gateway Communities.** Fisher biologists and furbearer program managers have documented occurrences of fisher predation on pets and poultry in the Midwest and Northeast, particularly near homes that are in remote settings in forested habitats. While local residents of the SW

[1] The denning period for fisher extends from approximately early March through the end of July/early August. In comparison, the popular hunting seasons for game like deer, bear, and elk are open primarily from August-January. While some hunting for game may occur into the spring, it is either limited to less popular species or is tied to addressing game management on a specific private property with limited permits (WDFW 2013b). The trapping season in Washington extends through March 31 (WDFW n.d., Furbearer Trapping Seasons and Rules).

[2] The fisher denning season overlaps with hunting seasons for wild turkey, cougar, mountain goat, bobcat, fox, raccoon, and rabbit and snowshoe hare. In the 2012-2013 season, approximately 3 cougar and 2 mountain goats were harvested in and around NOCA in the North Cascades, and 9 cougar and 3 mountain goats, were harvested around MORA in the South Cascades (WDFW 2013a). In 2009 (most recent year data is available), 84 beaver, otter and raccoon were trapped in all of Skagit County; 266 beaver, otter, mink, and raccoon were trapped in Whatcom County, and 52 beaver, otter, and raccoon were trapped in Pierce County (WDFW n.d., Washington Trappers' Report of Catch).

and NW Cascades could experience fisher predation on small domestic animals, especially if they are not confined, this would likely be comparable to impacts experienced by predation from other, more common, carnivores in the area (e.g. coyote and raccoons). This topic is addressed under *Neighboring Landowners, Land Use, and Socioeconomics* in chapter 3, and other impacts to urban quality/gateway communities have been dismissed.

**Minority and Low Income Populations.** As a state-listed species, it is possible that new restrictions may be placed on landowners in order to protect fishers and their habitat which could impact land use practices and the income of neighboring landowners (this potential impact is further analyzed under *Neighboring Landowners, Land Use, and Socioeconomics* in chapter 3). However it is not anticipated that this would impact minority or low income populations disproportionately. For this reason, analysis of impacts to minority and low-income populations has been dismissed from further consideration.

**Other Agency or Tribal Land Use Plans or Policies.** Although the fisher is not listed as a federal endangered or threatened species, the West Coast DPS of the fisher is a candidate for listing, and the USFWS plans to publish a notice related to the conservation status of the fisher in its west coast range by the end of September 2014, which may or may not propose to list the fisher in Washington State. (Any potential listing would not occur until September 2015 at the earliest.) It is possible that the USFWS' decision to list or not list the fisher in Washington State could be influenced by NPS and WDFW actions to restore the fisher to the SW and NW Cascades. However, considering the fact that a) proposed fisher restoration would be consistent with USFWS plans and policies to protect and promote recovery of federally listed and candidate species and b) a successful fisher restoration in the SW and NW Cascades would contribute to meeting state recovery goals and could result in the downlisting the species from its endangered status in Washington, any influence that fisher restoration would have on the USFWS' decision would likely persuade the USFWS to not to list the fisher in Washington State. It is not anticipated that USFWS would decide to list the fisher in Washington because of recovery efforts as again, proposed fisher restoration would be consistent with USFWS plans and policies to protect and promote recovery of the fisher. Therefore, any impact that the actions proposed in this Plan/EA would have on USFWS plans and policies would be beneficial, assuming that not listing the fisher in Washington would prevent the institution of additional administrative burdens on USFWS associated with protecting a listed species. Similarly, successful fisher restoration in the SW and NW Cascades would contribute to meeting state recovery goals and could result in downlisting the species from its endangered status in Washington which would beneficially impact WDFW plans and policies by reducing administrative burdens for WDFW associated with protecting a state listed species. As no action in this Plan/EA would conflict with agencies or tribal land use plans or policies, this topic has been dismissed from further consideration.

**Impacts from Potential Future Federal Listing of the Fisher.** While a potential future federal listing of the fisher may impact neighboring landowners, land use, and socioeconomics if fishers are present in the SW and NW Cascades, projecting the intensity and scale of these impacts from proposed fisher reintroductions is conjecture at this time because of the uncertainty and number of variables associated with such a potential listing. For example: the West Coast DPS of the fisher may or may not be proposed for listing in September 2014; a proposed listing could list the fisher as threatened or endangered; a proposed listing may or may not include Washington State; a proposed listing may or may not include designated Critical Habitat; a proposed listing may or may not entail additional restrictions; and any proposed listing that would be published in the Federal Register in September 2014 may change before a decision for listing is made, which is expected in September 2015. Furthermore, because fishers require similar forest cover as other federally-listed species (e.g. the spotted owl and marbled murrelet), it is

likely that any restrictions on landowners that could be associated with a federal listing of the fisher are already in place in Washington State, minimizing the likelihood that a potential listing would impact neighboring landowners, land use, and socioeconomics. In dismissing this impact from further consideration, the NPS also discussed the possibility that USFWS would consider NPS and WDFW actions to restore the fisher in the SW and NW Cascades as a reason to not list the fisher in Washington State.

**Energy Resources.** The implementation of a fisher restoration plan would result in a slight increase in the consumption of fossil fuels associated with aircraft and vehicle use during reintroduction and monitoring. However, such an increase would not measurably impact energy resources.

**Long-Term Management of Resources or Land/Resource Productivity.** Fisher reintroduction actions would not impact the long-term management of resources beyond those already described under *Neighboring Landowners, Land Use, and Socioeconomics* as discussed in chapter 3.

# Chapter 2 - Alternatives

The alternatives chapter describes the various actions that could be implemented for reintroducing the fisher in Mount Rainier National Park (MORA) and North Cascades National Park Service Complex (NOCA) (which includes North Cascades National Park and Ross Lake and Lake Chelan National Recreation Areas) and summarizes the environmental consequences of the alternatives.

As required by the National Environmental Policy Act (NEPA) and NPS Director's Order #12, federal agencies must explore and compare a range of reasonable alternatives that achieve, to a large degree, the defined purpose of and need for action while not violating any minimum environmental standards, as introduced in the discussion of relevant issues in *Chapter 1: Introduction.* Any alternatives considered for action must also be compared against a "no-action" alternative.

For this project, the interdisciplinary planning team developed one action alternative – with input from the public during the planning process – that can achieve the project objective in MORA and NOCA while not violating any minimum environmental standards outlined in chapter 1. Although considered, several other alternatives were dismissed from further analysis in this Plan/EA because they did not meet the purpose and needs and objectives or were unreasonable for other reasons. For more information on these "considered but dismissed" alternatives, please see *Alternatives Considered but Dismissed* on page 36.

## ALTERNATIVES

### Alternative A – No Action Alternative

Under Alternative A, the NPS would not partner with Washington Department of Fish and Wildlife (WDFW) to restore fishers into MORA or NOCA. No NPS funding would be allocated to fisher restoration, and no fisher reintroductions would occur on NPS lands.

However, the State of Washington would proceed with fisher restoration in the SW Cascades as outlined in WDFW's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (available at wdfw.wa.gov/publications/01556/), only no reintroductions would occur directly in MORA (Lewis 2013; Lewis, pers. comm., 2014a). Currently, the State has the funding and staff to initiate a fisher translocation to the SW Cascades in the fall of 2014, and it expects to obtain additional funding from both internal and external sources to continue the reintroduction in the SW Cascades per the Implementation Plan. Because all the candidate release sites included in the Implementation Plan for the SW Cascades reintroduction area are within the maximum movement distances recorded during the Olympic National Park reintroduction (up to 67 miles; Lewis 2014c) and the nearest candidate release sites to MORA are only 15-18.5 miles from park boundaries, it is predicted that fishers from the WDFW reintroduction effort would eventually colonize suitable habitat in MORA. However, the establishment of a persistent fisher presence in MORA would likely occur at a slower rate under Alternative A than a direct reintroduction to MORA (Alternative B) because the southern parts of the SW Cascades reintroduction area (south of State Highway 12) contain larger blocks of contiguous habitat away from highways, which may delay dispersal into MORA. Also, Highway 12 may act as a substantial impediment to dispersal, due to either behavioral avoidance or mortalities associated with vehicle collisions. That said, with a successful reintroduction, fishers would likely become distributed throughout the SW Cascades and may become established in MORA over time. WDFW would proceed with monitoring reintroduced fishers in areas where they travel and establish home ranges; if any monitoring would be proposed in MORA due to expected fisher presence, the NPS would work with

WDFW to minimize or mitigate potential impacts, such as limiting low elevation flights to Monday through Thursday.

While the State of Washington intends to continue with fisher restoration in the NW Cascades following a successful reintroduction in the SW Cascades, the feasibility of implementing this second reintroduction is uncertain due to funding and the future availability of fishers. While the State is currently seeking funding for the overall restoration of fishers in the Cascades, without NPS contributions, no money is yet available for the proposed reintroduction in the NW Cascades and obtaining the full funding for this second reintroduction would likely be delayed, if obtained at all. Considering that a delay in funding and therefore project implementation could also threaten the availability of fishers, it is assumed for the purposes of this Plan/EA that fisher would not be reintroduced to the NW Cascades in the next five to ten years.

Furthermore, should reintroductions not occur in the NW Cascades, it is unlikely that fishers from a successful SW Cascades reintroduction would be able to expand into the NW Cascades due to the distance between the two reintroduction areas and, more importantly, the barrier to dispersal that the Interstate 90 corridor presents to an expanding fisher population. Natural recolonization of fishers in the NW Cascades from other populations is also unlikely to occur due to geographical isolation. Fishers do not occur immediately north in British Columbia, and immigration from Idaho is unlikely due to a large expanse of unsuitable habitat east of the Cascades (Lofroth et al. 2010). Because of the uncertainties surrounding funding for this reintroduction and the unlikelihood of fisher dispersal to the NW Cascades from other populations, it is assumed for the purposes of this Plan/EA that fishers would not be restored to the NW Cascades under the No Action Alternative.

The NPS would continue present management activities under the No Action Alternative. For example, wildlife and wildlife habitat would continue to be protected under current park-specific guidance at MORA and NOCA.

## Alternative B – Preferred Alternative: Reintroduce Fishers into Mount Rainier National Park and North Cascades National Park Service Complex

Under Alternative B, the NPS would partner with WDFW to reintroduce fishers to the SW and NW Cascades, including MORA and NOCA. NPS funds would be allocated toward assisting the State with restoration efforts, and fishers could be reintroduced directly on NPS lands.

This alternative is largely based on WDFW's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (available at wdfw.wa.gov/publications/01556/) and relies on the best available science to determine appropriate management actions (Lewis 2013). Methods and processes outlined in the plan are based on those used in the Olympic fisher reintroduction 2008-2010. As articulated in the State's plan, fishers would be captured from a source population that is most closely related to that which historically occurred in the state (preferably from British Columbia) and would be reintroduced into the SW and NW Cascades, including MORA and NOCA, over the course of a minimum of four years (two years of releases per reintroduction area) with monitoring immediately following release efforts. A founder population of at least 80 fishers, with a bias toward adults and females, would be used for reintroduction efforts in each of the SW Cascades and the NW Cascades reintroduction areas (160 in total). The State and NPS have identified 16 candidate release sites in the two reintroduction areas (nine in the SW Cascades and seven in the NW Cascades), based on the availability of suitable habitat and habitat connectivity. These sites include two in MORA, the Nisqually River and Ohanapecosh, and three in NOCA, the lower Thunder Creek drainage, the north fork of the

Cascade River, and Ross Lake and Big Beaver Drainage[3] (Lewis 2013) (see *Figure 2.1: Southwestern Cascades Reintroduction Area* and *Figure 2.2: Northwestern Cascades Reintroduction Area*). Under this alternative, fisher releases are likely to occur at each of these release sites in MORA and NOCA. Fishers would preferably be released in the late fall / early winter to allow them to acclimate, to establish home ranges, to locate suitable den sites, and to become aware of potential mates before mating season (approximately March 1 – June 30).

Details of these reintroduction efforts are provided below and are outlined further in WDFW's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington*, available at wdfw.wa.gov/publications/01556/. Where the details outlined below and the State's Implementation Plan do not align, the NPS would rely on the information below for fisher reintroduction efforts on NPS lands.

### Source Population

The findings of genetic analyses indicate that fishers that historically occurred in Washington are most closely related to the extant fisher population in British Columbia, followed by the California population, and then by the western Alberta population (Lewis and Hayes 2004). Because of their genetic similarity, British Columbia fishers would be the first choice as a source population for a reintroduction in the SW and NW Cascades, while Alberta fishers would be the second choice for a reintroduction if fishers are unavailable from British Columbia (in adherence to NPS *Management Policies 2006*, 4.4.2.2). Although genetically similar to fishers that historically occurred in Washington, the California fisher population is unavailable as a reintroduction source because of its protected status and small size.

WDFW has already requested assistance from the British Columbia Ministry of Forests, Lands, and Natural Resource Operations (BCFLNRO) and Ministry of Environment (BCMOE), and they have agreed to help the State obtain fishers for translocation to Washington. WDFW and the NPS would still need to obtain a "Possession Permit" for the transport of fishers within the province and out of Canada.

If fishers become unavailable for translocation from British Columbia in the future, WDFW and the NPS would seek fishers from Alberta. Such action may require additional environmental analysis of potential impacts to the source population in Alberta, and formal requests would be made by WDFW to ministry authorities for their assistance in obtaining fishers for translocation to Washington.

### Obtaining and Transporting Fishers

As outlined in WDFW's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington*, the State and British Columbia ministry authorities would be responsible for obtaining, holding, and transporting fishers to Washington. NPS staff would assist as needed and appropriate. All protocols for capturing, handling, transporting, and caring for fishers in captivity would be based on those developed by Evans (2008, 2009, 2010) for the Olympic fisher translocation project (Lewis and Happe 2008, Lewis et al. 2010, 2011) and are briefly outlined in the sections below. The care, use, and handling of fishers during this project would meet or exceed the animal care guidelines of the American Society of Mammalogists (Sikes and Gannon 2011) and those reviewed and approved by the NPS Institutional Animal Care and Use Committee.

---

[3] Since completing the *Implementation Plan for Reintroducing Fishers to the Washington Cascades*, the NPS and WDFW identified the Ross Lake and Big Beaver Drainage as another candidate release site in the NW Cascades. The candidate release site in the middle Skagit/lower Ross Lake National Recreation Area that was identified in the Implementation Plan has also been further refined to the Lower Thunder Creek Drainage.

### *Capture*

WFDW would work with the BCMOE coordinator and BCFLNRO staff to determine how and where fishers would be captured for translocation. Fishers would be captured by licensed British Columbia trappers. As in the Olympic translocation project, WDFW would hire a contractor (i.e. capture coordinator) to coordinate and oversee fisher capture efforts. The WDFW project leader and capture coordinator would be responsible for paying trappers for fishers deemed acceptable for translocation.

Fishers would be captured using box (cage-type) traps provided by WDFW. The capture coordinator would also provide participating trappers with fisher transport boxes (40 x 40 x 90 cm) to safely hold fishers during transport to the captive facility and to Washington. During transport from the trap-lines to the holding facility, fishers would be provided food (e.g., meat scraps or cat food) and water inside their transport box.

### *Transfer and Holding in Captivity*

Fishers would be expected to spend from one to three weeks in captivity between capture and release. Length of time in captivity would be determined by how many animals have been captured and are available for transport to Washington. For example, fishers would not be transported to Washington until there are five or more that could be shipped at one time. Consequently, some individuals would spend more time in captivity than others. During this time, fishers would be housed and cared for in British Columbia in a secure, enclosed space that would be staffed by at least one on-site, captive wildlife specialist. The specialist(s) would be responsible for transferring captured animals to housing units; providing food, water, and medical care; handling fishers as necessary; coordinating with and assisting veterinarians with health inspections/certifications and medical treatments; and assisting in preparing fishers for transport and release. Fishers would be provided generous daily portions of a variety of foods (e.g., 400 g for females, 550 g for males) to encourage weight gain.

### *Health Evaluations, Medical Treatments, and Preparation for Reintroduction*

Before fishers are transported to Washington, veterinary examinations would be completed to determine if individual fishers are suitable for translocation (i.e., healthy, no debilitating injuries) and to issue a health certificate, which is required for each fisher being transported from British Columbia to Washington. Fishers brought to the captive facility would be isolated to prevent disease transmission and examined to evaluate their health and physical condition. The evaluation would include determining the individual's sex; obtaining weight and morphological measurements; and identifying wounds, deformities, and evidence of disease or ectoparasites. Individual fishers would also be treated for wounds, injuries or infections, and would be vaccinated for rabies and distemper. Ivermectin and Droncit treatments would be provided for endoparasite infestations, and flea and tick treatments would be provided as necessary.

Evaluations of health and physical condition, medical treatments, and reintroduction preparations require each fisher to be chemically immobilized. To minimize the stress and risk associated with chemical immobilization and handling, each fisher would be immobilized only once. All evaluation, treatment, and preparation procedures would be conducted at that time, with the exception of those individuals that require additional medical attention. Cooperating veterinarians would conduct all examinations, immobilizations, medical treatments, and surgeries, and would be assisted by project biologists and captive wildlife specialists.

To monitor fishers after they are released, each fisher (if not equipped with a satellite collar – see *Adaptive Management* on page 31) would have a VHF transmitter surgically implanted into its abdomen

by a licensed veterinarian; each transmitter would have an expected lifespan of ≥24 months and an incorporated mortality-sensor. Each fisher would also be marked with a passive integrated transponder (PIT) tag, which is a small cylindrical tag that is inserted under the skin behind the ear. The PIT tag allows individuals to be identified by a unique identification code programmed into the tag, which can be read when an electronic receiver is passed over the tag (i.e., when re-captured alive or found dead). DNA samples (i.e., hair and blood sample and ear punch) would be collected to genotype each fisher. Fishers could then be identified if they are recovered, recaptured, or if a hair sample is collected at a hair-snare station. Lastly, each fisher would be photographed (i.e., photos of the teeth and chest or abdominal blaze) to allow identification of individuals by any unique physical characteristics.

**Requirements for Importation to Washington**

The importation of fisher to Washington from British Columbia would meet all federal, state, and provincial requirements and include health certifications, permits, border-crossing inspections by customs and USFWS inspectors, and notifications. At the Canada-U.S. border, inspections would be expected to include only visual inspections of fishers in their transport units.

### Reintroduction Locations

The *Feasibility Assessment for Reintroducing Fishers to Washington* identified two areas suitable for reintroducing fishers in the Washington Cascades: the SW Cascades and NW Cascades. The selection of reintroduction areas was based on three primary considerations; reintroduction areas must be 1) large areas dominated by federal land ownership, 2) areas with large amounts and dense concentrations of high-quality habitat (Lewis and Hayes 2004), and 3) areas that include few large highway corridors. The SW and NW Cascades reintroduction areas were chosen because they met these criteria and were deemed capable of supporting self-sustaining populations of fishers.

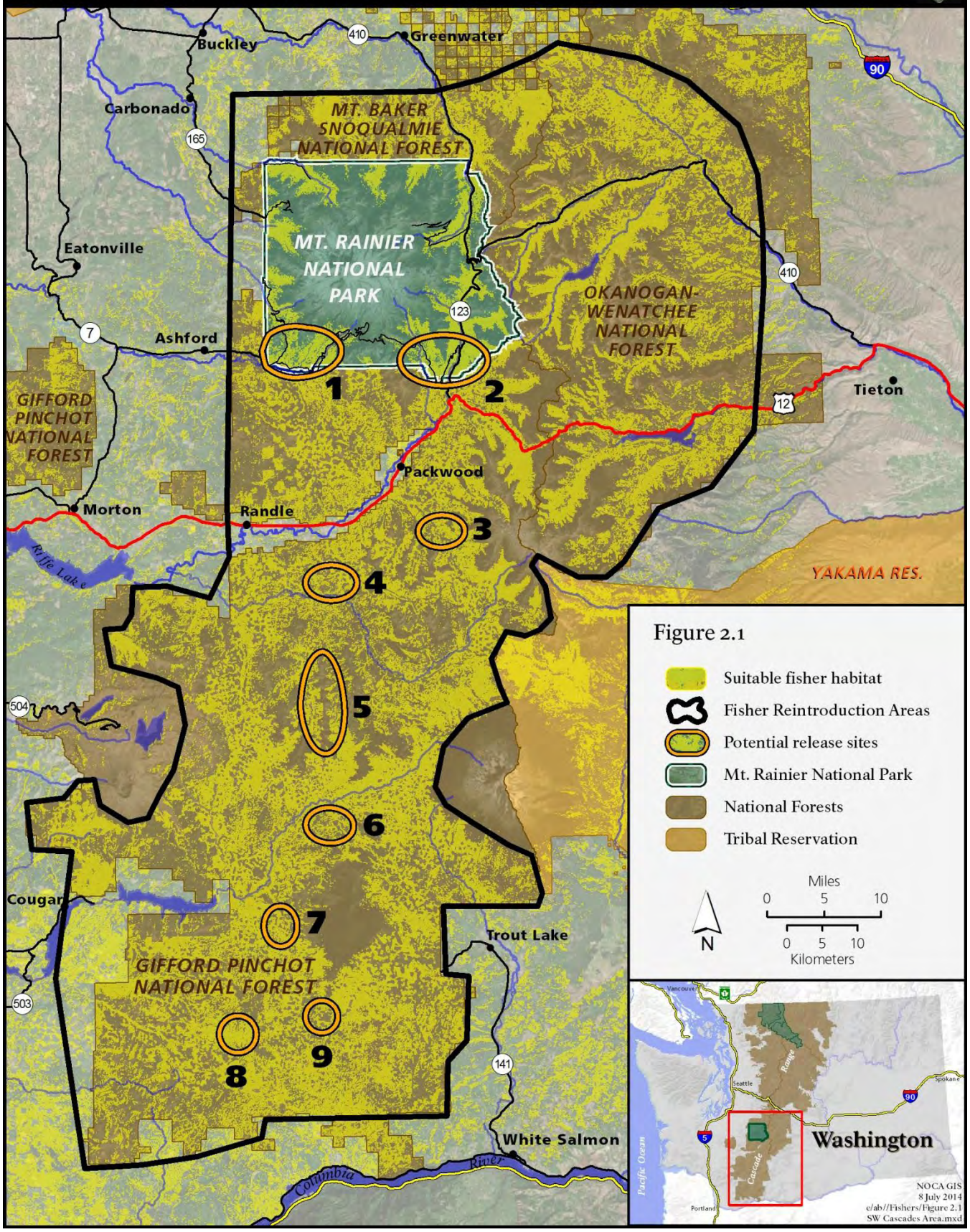
Based on these reintroduction areas, WDFW and the NPS identified nine candidate release sites in the SW Cascades reintroduction area and seven release sites in the NW Cascades reintroduction area (Lewis 2013). Candidate release sites were selected to allow the release of fishers in interior portions of a reintroduction area that are 1) dominated by suitable habitat, 2) more than 6 miles away from highway corridors (with few exceptions), and 3) accessible by vehicle during all or part of the release season (November to February). Two of the candidate release sites in the SW Cascades reintroduction area are located in MORA: the upper Nisqually River and upper Ohanapecosh River. Three of the candidate release sites in the NW Cascades reintroduction area are located in NOCA: the lower Thunder Creek drainage, the north fork of the Cascade River, and Ross Lake and the Big Beaver Drainage.

#### *SW Cascades Reintroduction Area and Candidate Release Sites in MORA*

The SW Cascades reintroduction area contains large landscapes dominated by high-quality fisher habitat. Because this area is less dissected by high-elevation ridges as compared to the NW Cascades area, it contains larger expanses of continuous, high-quality habitats for fishers. The SW reintroduction area was the highest ranking reintroduction area in the Cascades ecosystem (Lewis and Hayes 2004) and is expected to support a large, self-sustaining population of fishers that may ultimately provide dispersers to other suitable areas within the region. Of the nine candidate release sites identified in the *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington*, two are located in MORA (*Figure 2.1: Southwestern Cascades Reintroduction Area*). These two sites were evaluated in the field by the WDFW Project Manager and the NPS Project Manager, and release locations were identified which best met the criteria listed above.

**Figure 2.1: Southwestern Cascades Reintroduction Area**

Fisher Restoration Plan/Environmental Assessment



**Nisqually River**
The Nisqually River corridor (site 1 in Figure 2.1) within MORA contains high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. The road between the Nisqually Entrance and Paradise is maintained and kept open year-round, and constitutes the only road in MORA that is maintained in the winter. The Longmire Campground, across the Nisqually River from the NPS administrative area of Longmire, was chosen as a potential release site due primarily to its easy access in the winter. The NPS maintains a water treatment plant there; so, the road through the campground is kept open for access during the winter.

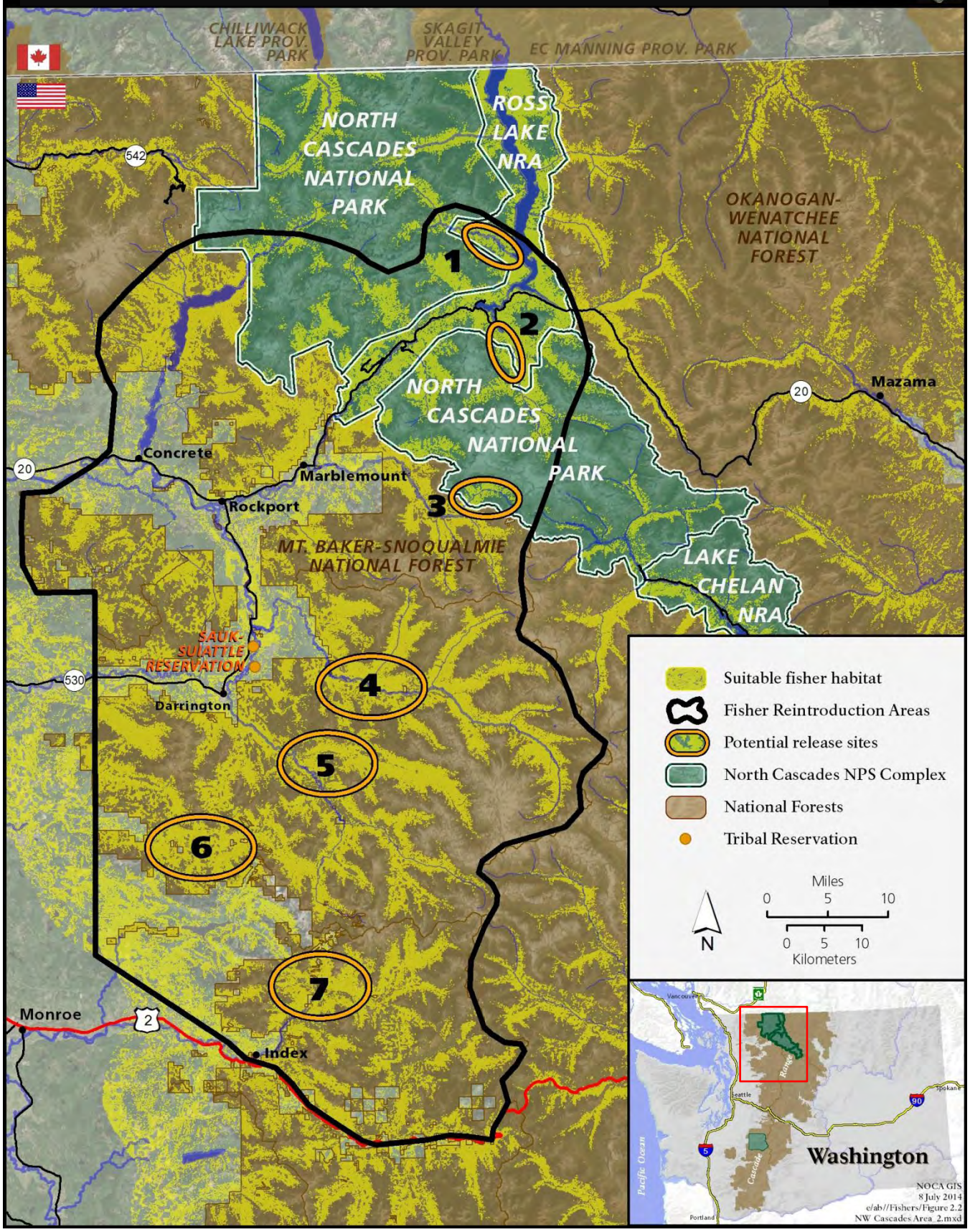
**Ohanapecosh River**
The Ohanapecosh River corridor (site 2 in Figure 2.1) within MORA also contains high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. Although Highway 123, which parallels the Ohanapecosh River, is not maintained and kept open in the winter within MORA, the State keeps the highway open to the NPS boundary. A site visit confirmed the feasibility of releasing fisher on NPS lands a short distance into the Park by carrying the transport boxes into the park on foot.

***NW Cascades Reintroduction Area and Candidate Release Sites in NOCA***
The NW Cascades reintroduction area contains large landscapes dominated by high-quality fisher habitat. Much of this habitat occurs in the low and mid-elevation landscapes of river drainages and is distributed in a dendritic pattern across the reintroduction area because these habitats are separated by the high-elevation ridges and mountains that characterize the North Cascades ecosystem. The NW Cascades area ranked third among the three areas identified as suitable for successfully reintroducing fishers in western Washington (after the Olympic and SW Cascades reintroduction areas; Lewis and Hayes 2004). Despite its lower ranking, the NW Cascades area is expected to support a relatively large, self-sustaining population of fishers that may ultimately provide dispersers to other suitable areas within the region. Seven candidate release-sites were identified within the interior of the reintroduction area, three of which are located in NOCA (*Figure 2.2: Northwestern Cascades Reintroduction Area*).

**Thunder Creek**
The Skagit River corridor within NOCA (site 2 in Figure 2.2), particularly within the Thunder Creek Drainage and side drainages, contains high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. This area is easily accessible from the Colonial Creek Campground and State Route 20, which is open and maintained by the Washington State Department of Transportation through milepost 134, just past Colonial Creek Campground and Thunder Creek, over the winter. While fishers could be released directly from the campground, which is closed to the public over the winter, release boxes could also be carried in by foot a short distance up the drainage. The west shore of the creek is accessible via the Thunder Creek Trail, and the east shore of the creek is accessible via an informal fisherman's trail off State Route 20.

**Cascade River**
The North Fork of the Cascade River within NOCA (site 3 in Figure 2.2) also contains high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. This potential release site is accessed off the Cascade River Road which is typically closed at the Eldorado trailhead, just inside the park boundary, during the winter. Vehicular access above this point is uncertain over the winter due to snowfall, but it would be possible to carry the transport boxes into the park on foot from the closure gate, which is approximately three miles from the Cascade Pass Parking Lot.

**Figure 2.2: Northwestern Cascades Reintroduction Area**
Fisher Restoration Plan/Environmental Assessment



**Ross Lake and Big Beaver Creek**
Although not specified in the *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington*, the shores of Ross Lake and the Big Beaver Drainage (site 1 in Figure 2.2) also contain high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. These areas are accessible by boat year-round, via Diablo Lake and the Ross Dam haul road.

### Releasing Fishers in the SW and NW Cascades
WDFW's Cascades fisher reintroduction project would include the release of approximately 160 fishers into the SW and NW Cascades reintroduction areas over a period of four to eight years, in two stages.

The first stage would be the release of ≥80 fishers in the SW Cascades reintroduction area (see *Figure 2.1: Southwestern Cascades Reintroduction Area*) over a two-year period (approximately 40 fishers per year). Each fisher would be equipped with a radio-transmitter with a ≥2-year lifespan. Fishers would be released in years one and two of the project, and their movements and behaviors would be monitored using radio telemetry from years one to three (see *Monitoring* on page 33). To meet the founder population objectives, fisher releases would be conducted for a third year if 1) a minimum of 80 fishers is not obtained in years one and two, or 2) fisher survival in years one or two is less than 50 percent. In the event that capture efforts are required in year three, WDFW and the NPS would expand fisher monitoring efforts to include a fourth year (years one to four).

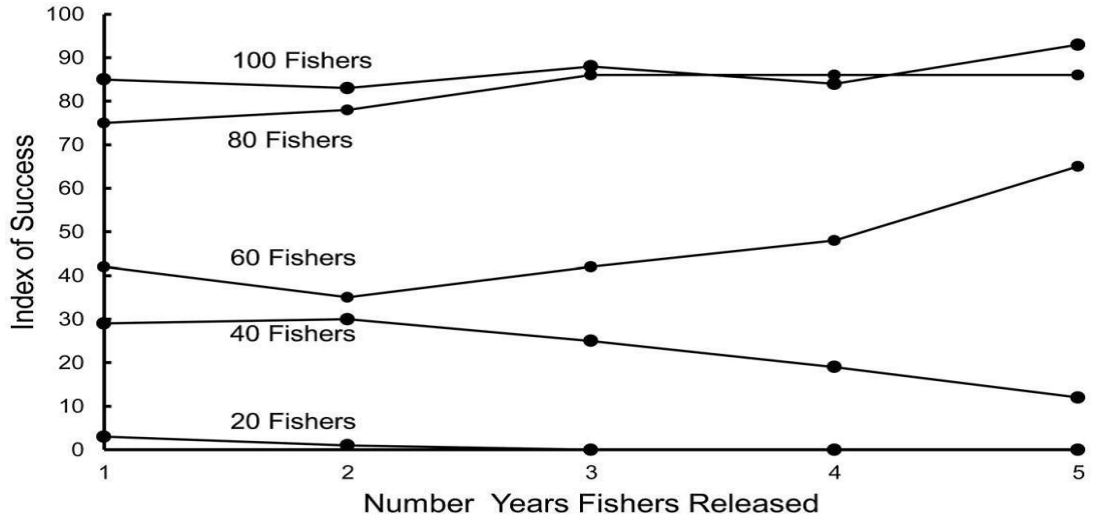
The second stage of the reintroduction would be the release and monitoring of 80 fishers in the NW Cascades reintroduction area (see *Figure 2.2: Northwestern Cascades Reintroduction Area*), and this second stage would follow the approach and contingencies outlined above for stage one in the SW Cascades reintroduction area. Fishers would not be released in the NW Cascades reintroduction area before the completion of fisher releases in the SW Cascades reintroduction area.

While a percentage of the founding populations in the SW and NW Cascades would be reintroduced directly into MORA and NOCA under this alternative, fishers would also be reintroduced to other public lands within the SW and NW Cascades reintroduction areas.

#### *Founder Population*
The target founder population size of 80 fishers in each reintroduction area is based on the success of previous fisher translocations and the findings of population modeling. Lewis et al (2012) found 100 percent success among reintroductions of ≥80 fishers and high likelihoods of success (75-85 percent) based on model predictions of a founder population of 80 fishers (depending on the number of years that those 80 were released over; see *Figure 2.3: Reintroduction Success Based on Size of Founding Population and the Number of Years in which that Population was Released (modified from Lewis et al. 2012)*). Population modeling for the Cascades reintroduction areas indicated that populations that started with 60 or 100 females resulted in larger resident population sizes, and were established more quickly, than populations that started with 30 females (Lewis and Hayes 2004).

#### *Release Process*
The number of fishers released, release locations, and timing of releases would vary depending on fisher availability and the findings of monitoring efforts of previously released fishers (see *Adaptive Management* on page 31 for more information). For example, fisher occupancy patterns and reproductive success would be used to inform release strategies in subsequent years and would help determine if additional individuals should be released in a specific area or if certain release areas should not be used.

**Figure 2.3: Reintroduction Success Based on Size of Founding Population and the Number of Years in which that Population was Released (modified from Lewis et al. 2012)**




Fishers would be released in the NW and SW Cascades via hard releases (i.e., releasing fishers immediately upon arriving at a release site) as opposed to soft releases whereby fishers are temporarily housed at the release site prior to release to encourage acclimation and fidelity to the reintroduction area (see *Alternatives Considered but Dismissed* on page 36 for more information). Additionally, British Columbia trappers would be encouraged to capture fishers in November and December to allow fall and early winter releases, which are expected to improve reproductive success.

Based on experience gained from the reintroduction at OLYM, fishers would likely be released at only three to five release sites in each reintroduction area (three to five of the nine release sites in the SW Cascades and three to five of the seven release sites in the NW Cascades). Releasing founder individuals at fewer release sites within a recovery area is likely to improve mate acquisition and reproductive success in the first two-to-three years of the project by concentrating potential mates in fewer areas. Similarly, when possible, fishers would be released in groups that include more than one adult female and at least one large adult male. However, the size and composition of the group released would be dictated by the age and sex of recently captured fishers and the goal of minimizing the duration of captivity.

### *Reintroduction Schedule*

It is expected that fishers would be released over a four-year period in the SW and NW Cascades reintroduction areas, including two years of releases in the SW Cascades followed by two years of releases in the NW Cascades. Proceeding with fisher reintroductions in the SW and NW Cascades is contingent upon the availability of fishers and adequate funding. If these requirements are met, a reintroduction of fishers to the SW Cascades reintroduction area would begin as early as fall 2014. Fishers would be captured during the trapping season in British Columbia, which extends from November 1st to February 15th, and therefore, captured fishers could be released in Washington as soon as early to mid-November 2014.

A timeline provided in Table 2.1 below summarizes the preferred timing of fisher reintroductions in the SW and NW Cascades reintroduction areas. Additional monitoring and research activities, over additional years, may be added to this timeline if additional funding becomes available.

**Table 2.1: Reintroduction Schedule**

| **Year 1** |
|---|
| **SW Cascades/MORA** |
| *November 2014 to February 2015* – capture, hold, transport, and release approximately 40 fishers at selected sites within the SW Cascades reintroduction area (including MORA) |
| *November 2014 to December 2015* – monitor released fishers |
| *March 2015 to June 2015* – emphasize monitoring of females to confirm reproduction |
| **Year 2** |
| **SW Cascades/MORA** |
| *November 2015 to February 2016* – capture, hold, transport, and release approximately 40 fishers (to allow the release of approximately 80 fishers in years 1 and 2) at selected sites within the SW Cascades reintroduction area (including MORA) |
| *November 2015 to December 2016* – monitor fishers released in years 1 and 2 |
| *March 2016 to June 2016* – emphasize monitoring of females to confirm reproduction |
| **Year 3** |
| **SW Cascades/MORA** |
| *November 2016 to December 2017* – monitor fishers released in years 1 and 2 |
| *March 2017 to June 2017* – emphasize monitoring of females to confirm reproduction |
| **NW Cascades/NOCA** |
| *November 2016 to February 2017* – capture, hold, transport, and release approximately 40 fishers at selected sites within the NW Cascades reintroduction area (including NOCA) |
| *November 2016 to December 2017* – monitor released fishers |
| *March 2017 to June 2017* – emphasize monitoring of females to confirm reproduction |
| **Year 4** |
| **NW Cascades/NOCA** |
| *November 2017 to February 2018* – capture, hold, transport, and release approximately 40 fishers (to allow the release of approximately 80 fishers in years 1 and 2) at selected sites within the NW Cascades reintroduction area (including NOCA) |
| *November 2017 to December 2018* – monitor fishers released in years 3 and 4 |
| *March 2018 to June 2018* – emphasize monitoring of females to confirm reproduction |
| **Year 5** |
| **NW Cascades/NOCA** |
| *November 2018 to December 2019* – monitor fishers released in years 3 and 4 |
| *March 2019 to June 2019* – emphasize monitoring of females to confirm reproduction |

In the event that fewer than 80 fishers are released, or fisher survival is less than 50 percent in years one or two in the SW Cascades, reintroduction efforts would continue in the SW Cascades for an additional year (Year 3). In this situation, all reintroduction actions in the NW Cascades would be pushed back at least one year. Similarly, reintroduction efforts would extend for an additional year in the NW Cascades in the event that fewer than 80 fishers are released, or fisher survival is less than 50 percent, in the first two years of the reintroduction project in the NW Cascades.

## Adaptive Management

Alternative B would also incorporate adaptive management practices that allow for incorporation of new information over time to modify management actions. By using an adaptive management approach with an associated monitoring program, managers would be able to change implementation approaches to better meet the goals of the project as new information was obtained. The adaptive management approach and its integration into Alternative B are more fully described below.

### *Definition and Use of Adaptive Management*

Adaptive management is based on the assumption that current resources and scientific knowledge are limited, and therefore, management decisions and policies should be viewed as hypotheses subject to

change (Holling 1978). Based on these assumptions, an adaptive management approach attempts to apply available resources and knowledge to guide management actions, and adjusts management techniques as new information is revealed.

The use of adaptive management requires setting quantitative objectives, exploring alternative management strategies, implementing actions, monitoring progress, evaluating performance in terms of risks and benefits, and adjusting or continuing implementation based on monitoring and evaluation (Nyberg 1998; Goodman and Sojda 2004). Ideally, the resulting management of a project improves as more information is gathered, analyzed, and incorporated into the process. The applicability and success of decisions depends on the frequency and precision of monitoring (Williams 1997).

#### *Application of the Adaptive Management Process in Fisher Restoration*

Successful management of natural systems is a challenging and complicated undertaking. The Department of the Interior requires that its agencies use adaptive management to fully comply with the CEQ guidance that requires "a monitoring and enforcement program to be adopted . . . where applicable, for any mitigation" (516 DM 1.3 D (7); 40 CFR 1505.2).

For this alternative, adaptive management starts with the hypothesis that self-sustaining fisher populations can become established in the SW and NW Cascades of Washington State. Monitoring under this alternative would test for survival and movement, home range establishment, and reproduction; and data collected could be used to evaluate the success of various release approaches, monitoring approaches, and overall reintroduction success. These data could also be used to indicate when mid-course adjustments can or should be undertaken to improve the likelihood of reintroduction success. For example, if fishers released at a certain release site consistently moved well away from the site or there was a high rate of mortality in the vicinity of a certain release site, the use of that release site would be discontinued. Based on location, movement or survival data, mid-course adjustments would be made to improve survival and home range establishment, which are important for reintroduction success. These adjustments are further described below.

#### *Potential Adaptive Management Approaches*

Under this alternative, the project management team will manage the reintroduction process and the monitoring program to measure reintroduction success. The management team may consult with other fisher or translocation experts when addressing implementation and monitoring issues.

It is envisioned that the adaptive management approach would be used in the following areas:

**Source Populations.** To best match the fisher population that historically occupied the SW and NW Cascades, preference would be given to obtaining fishers from British Columbia. However, if this was not possible, efforts would be made to obtain fishers from Alberta, the third most closely related population to fishers that historically occurred in Washington. The second most closely related population, found in California, is too small for translocation.

**Number of Fishers Released.** The number of fishers released each year would depend on the availability from the source population and the availability of funding to purchase additional fishers. While the number of fishers captured each year is expected to vary, the goal of the project is to release a total of approximately 160 fishers. However, if fewer fishers could be obtained from the source population, reintroduction efforts would focus first on the SW Cascades reintroduction area. If the survival rate for a particular year was low in one reintroduction area, more fishers might be released there the following year.

**Release Locations.** Release locations would be adapted based on monitoring results from the first year of reintroduction in each reintroduction area and the availability of fishers from the source population. Monitoring results would indicate if previously used release site should be used for subsequent releases or if alternative sites should be used instead.

**Timing of Release.** The preference would be to conduct the initial release in the fall and early winter. Trappers would be asked to capture fishers as early in the season as possible, and this request would be accompanying by a greater price paid per fisher. Is this approach is not successful, project managers could 1) increase the price paid to prompt more capture effort, or 2) accept fishers whenever they are captured during the trapping season (1 November-15 February).

**Telemetry.** Currently, VHF radio transmitters are the only devices available that meet the monitoring needs and objectives of this proposed project. However, satellite telemetry technology is advancing rapidly and has the advantage of being able to collect more data and requiring less aerial overflights than radio-transmitters. It would therefore have less impact on the wilderness character of the Mount Rainier and Stephen Mather Wildernesses in MORA and NOCA, respectively. While current designs are too large and heavy for their use on female fishers, satellite collars would be used on adult male fishers on a trial basis in the first year of the first reintroduction. If found to be effective, and technology advances to meet project needs (e.g. reduction in size and weight), project managers would closely evaluate their use and could increase the use of satellite collars during project implementation (see *Appendix B: Minimum Requirement Decision Guide*).

**Citizen Science.** The fisher reintroduction efforts would provide an opportunity for local schools, colleges, and communities to be involved in the effort. Opportunities for citizen involvement are described under *Visitor Use and Outreach* in this alternative and would primarily involve citizens assisting with monitoring efforts. As the reintroduction efforts develop, opportunities could expand to include working with the NPS and WDFW outreach and education coordinators.

#### *Monitoring*

Reintroduction monitoring has two general purposes: to allow biologists to adaptively manage the reintroduction to increase the likelihood of success, and to determine if the reintroduction has succeeded at reestablishing a self-sustaining population. Many of the earliest translocations used incidental observations to evaluate success retrospectively; for example, fishers were released and only informal information (e.g., incidental captures, road kills) was available to indicate if a reintroduced population had persisted. More intensive monitoring, however, can indicate when a reintroduction is not succeeding before it is too late to make mid-course adjustments to improve the likelihood of success (i.e., adaptive management).

Under this alternative, a monitoring plan would be developed by WDFW and MORA and NOCA to monitor the status of the reintroduction efforts, and data gathered would be used to adaptively manage ensuing implementation tasks.

Monitoring in reintroduction areas would be conducted in two phases. Phase 1 (detailed in the *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington*) would primarily involve the telemetry monitoring of radio-transmittered fishers. Telemetry monitoring would be achieved primarily by aerial overflights of the project area, followed up with investigation on foot for suspected denning or mortality events. Phase 1 monitoring would begin as soon as fishers are released in the first two years in a reintroduction area, and would continue until year three, when transmitters reach their expected lifespan. At the end of this three-year period, the reintroduction would be

considered initially successful if there is evidence of a reproductive population within the reintroduction area as indicated by 1) home range establishment by at least 50 percent of fishers that survive until the fall of their first year following release, and, 2) documented reproduction by one or more females in years two and three in the reintroduction area. Phase 1 monitoring would be extended to a fourth year if fisher releases are necessary in the third year to meet founder population objectives.

Because the long-term success of a reintroduction (i.e., the persistence of a self-sustaining population) cannot be determined within three or four years, phase 2 of the monitoring program would follow the active telemetry monitoring phase (phase 1). With adequate funding, phase 2 monitoring would be conducted between years five and ten following the first releases in a reintroduction area. The goal of phase 2 monitoring is to determine the distribution and abundance of resident fishers. It would involve a multi-year deployment of a sampling grid of hair-snare and remote-camera stations across areas where fishers may have become established within or outside the Cascades Recovery Area, following the methodology described by Jenkins and Happe (2013). Managers would use this information to assess the status of a reintroduced population and to determine if any action is needed to support a reestablished population (e.g., an augmentation could be employed to fortify a small, vulnerable population). While a minimum tool analysis for wilderness management was completed for this proposed action (Appendix B), which included some short-term monitoring with hair snares and camera stations, a separate minimum tool analysis will need to be completed prior to initiating the longer term phase 2 monitoring to better assess the minimum necessary for completing that monitoring once more information is known about where fishers may be establishing home ranges and den sites.

**Monitoring Tools**

A number of tools and levels of monitoring intensity could be employed at various stages in the monitoring program. Project managers would be responsible for implementation planning and would evaluate project success throughout the translocation and monitoring phases of the project. Release and monitoring approaches could also be modified during the reintroduction based upon the findings of ongoing monitoring, the availability of suitable satellite collars, and available funding.

**Telemetry.** Aerial telemetry would be the main tool used to monitor fishers with VHF radio-transmitters during each reintroduction (phase 1 monitoring). For a maximum of two years following each release (years 1-3 for each reintroduction), a small fixed-wing aircraft (e.g., Cessna 182) would complete weekly flights, weather permitting, above suitable fisher habitat in MORA and NOCA (see Figures 2.1 and 2.2) to locate fishers that occupy or move through the parks. During the initial search period of each flight, aircraft would be as high as possible, while still close enough to obtain a signal. However, aircraft may fly as low as 500 feet above ground level (agl) or 333 feet above the tree canopy, whichever is higher, when fishers are detected in order to obtain a precise location of the signal. The number of locations obtained for each fisher would be limited by 1) available funding for telemetry flights, 2) suitable weather conditions for flying, and 3) lifespan of radio-transmitters. Given potential limitations on data collection, the objective would be to get at least one location per week for individual fishers. Where access is limited, it may only be possible to obtain two locations per month for fishers via aerial telemetry. Beginning in February, emphasis would be placed on tracking adult females until their reproductive status is determined. Where access allows, den sites would be investigated on foot to confirm reproduction.

Less aerial telemetry may be necessary in later release/monitoring years if satellite collars are implemented with increasing frequency (see *Adaptive Management* on page 31).

**Genetic Sampling.** All released fishers would be genotyped through the collection of DNA via ear punches and blood and hair samples. Released individuals (or their offspring) could then be identified and confirmed as alive at a specific time and place through the use of hair-snares (Mowat and Paetkau 2002) placed within a reintroduction area or the larger recovery area. Genetic sampling can provide information on the survival, location, movements, reproductive success, mate selection, offspring, and parentage of individual fishers. It can also be used to estimate population size (Mowat and Paetkau 2002), which is a valuable measure of reintroduction success. Genetic sampling could be used as an additional monitoring technique during phase 1 monitoring and would be an essential component in phase 2 monitoring.

**Remote Cameras.** Camera stations are effective for detecting the presence of fishers. Remote cameras would be used during phase 1 of the monitoring program to detect repeated female visitation at suspected den sites and the presence of kits. Remote cameras would also be used with hair-snares in a sampling grid of detection stations deployed in phase 2 of the monitoring program.

**Incidental Observations.** Fisher presence has been detected incidentally when 1) fishers were captured in traps set for other species, 2) fishers were killed by vehicles, 3) fishers were detected at remote camera stations set for others species, 4) an abundance of sightings of fishers or fisher tracks was observed, or 5) evidence of porcupine predation was observed. Incidental observations could be valuable in indicating the success of a Cascade reintroduction, but because of their informal and unpredictable nature, they cannot be structured into an active monitoring program. However, incidental observations are useful when targeting areas for more intensive monitoring efforts.

### Visitor Use and Outreach

Under this action alternative, MORA and NOCA would conduct outreach activities concerning the recovery effort. Specifically, if funding is available, education and interpretive measures could be implemented and may include brochures, publications, and information on MORA and NOCA's websites about the fisher biology, fisher ecology, and the restoration program.

The NPS and WDFW would also seek opportunities and support to involve citizen science in the fisher reintroduction process. Opportunities would focus on fisher monitoring efforts and would include, but would not be limited to, assisting staff with deploying and monitoring hair-snare and camera stations, assisting field crews in locating fishers from the ground, identifying the location of den sites, and conducting follow-up measurements of den site characteristics after females have left the site. As the reintroduction program develops, opportunities could be expanded to include working with the NPS and WDFW outreach and education coordinators (see *Adaptive Management* on page 31).

Throughout the project, the NPS and WDFW would communicate with the public through press releases and other outreach tools about the status of reintroduction and monitoring efforts. Additionally, private landowners could be asked to work voluntarily with WDFW to protect known den sites, such as establishing a voluntary temporary buffer around known active fisher dens during the denning season (generally from March 1 until June 31). Activities that may be restricted around known, active den sites include timber harvest activities (e.g., felling, road building) and other potentially disturbing activities.

### Mitigation Measures

Under Alternative B, the NPS would also implement the following mitigation measures to reduce, if not eliminate, potential impacts from the actions outlined above.

- WDFW would check and treat individual fishers for fleas, ticks, endoparasites, distemper, and rabies, and each fisher would be inspected and certified as suitable for release by a licensed veterinarian prior to release under standard protocols.
- Fishers would not be released during marbled murrelet and northern spotted owl nesting seasons.
- Fisher releases would occur along roads or trails by vehicle and foot, outside of designated wilderness.
- Where access allows, telemetry would be completed by foot.
- All fixed-wing radio telemetry flights would be at flight elevations higher than 500 feet agl or 333 feet above the tree canopy, whichever is higher. When fishers are not detected, flights would be as high as possible, while still close enough to obtain a signal.
- Whenever possible (weather permitting), aerial telemetry flights would occur between Monday and Thursday, with a maximum of five flights per month.
- All known bald eagle territories would be avoided during telemetry flights.
- All other monitoring activities, such as carcass retrieval and temporary camera installations, would occur by foot within designated wilderness.
- If wolf dens or rendezvous sites are encountered during field monitoring of fishers, activities would be restricted to outside 0.5 mile of den or rendezvous sites.
- Landscapes selected by fishers would be mapped and evaluated to assess assumptions made on predicted elevation and habitat selection patterns of restored fisher population, and the degree of overlap with northern spotted owls and lynx.
- Crews working on field projects would record signs of fisher presence and activity.

Mount Rainier National Park and North Cascades National Park Service Complex together conducted a minimum requirement analysis to determine whether or not fisher reintroduction is appropriate in the Mount Rainier and Stephen Mather Wilderness and if so, to determine the minimum tools or techniques necessary to successfully meet the project purpose and objectives. The minimum requirement analysis is included in Appendix B.

### Implementation Costs

Estimated implementation costs have been developed by WDFW and are included in the State's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (available at wdfw.wa.gov/publications/01556/) (Lewis 2013). The estimated budget, which includes costs for obtaining, transporting, releasing, and monitoring fishers over a five-year period for both the SW and NW Cascades reintroduction areas, amounts to approximately $1.1 million, a cost shared by WDFW, the NPS, and other agencies and organizations invested in the conservation of this species. State and national park personnel would provide in-kind contributions of staff time, telemetry equipment, and field and camping supplies for reintroduction tasks not included in the budget.

## ALTERNATIVES CONSIDERED BUT DISMISSED

The Council on Environmental Quality guidelines for implementing NEPA requires federal agencies to analyze all "reasonable" alternatives that substantially meet the purpose and need for the proposed action (see *Chapter 1 - Introduction* on page 1). Under NEPA, an alternative may be eliminated from detailed study for the following reasons:

- Technical or economic infeasibility;
- The inability to meet project objectives or resolve need for the project;

- Duplication of other less environmentally damaging alternatives;
- Conflicts with an up-to-date valid plan, statement of purpose and significance, or other policy; therefore would require a major change in that policy or plan to implement;
- Environmental impacts too great.

The following alternatives or actions were considered during the alternatives development phase of this planning process but were dismissed from further consideration because they met one or more of the above criteria.

## Allow Fishers to Return Naturally

As described in chapter 1, recolonization is not a reasonable alternative because of the absence of nearby populations to naturally immigrate to the SW and NW Cascades (Hayes and Lewis 2006). There are no fisher populations known to exist in southern British Columbia or northern Oregon that could recolonize the Cascades from the north or south, respectively (Lofroth et al. 2010). Fisher populations in Idaho or those that might immigrate from Idaho to the Selkirk Recovery Area in eastern Washington are not connected to the Cascades via suitable habitat, and the fisher population that has been recently reintroduced to the Olympic Mountains in western Washington is too small and too disjointed from the Cascades, via suitable habitat, to feasibly provide dispersers to the SW and NW Cascades in the foreseeable future (Hayes and Lewis 2006). This alternative would therefore fail to meet project objectives.

## Implement Reintroduction in One Park Only

When developing alternatives, the planning team considered completing only one of the two proposed reintroductions. If reasonable, this alternative would have likely proposed reintroducing fishers to MORA and not NOCA, as the SW Cascades is a higher priority ecosystem for fisher restoration (Hayes and Lewis 2006). Regardless of which park and reintroduction area received the fisher reintroduction, the establishment of fisher in the alternate reintroduction area would require immigration from the source reintroduction area across the Interstate 90 (I-90) corridor which is a significant barrier to movement for wildlife both by altering their behavior as well as causing high rates of mortality (I-90 sees close to 30,000 cars per day) (Alexander and Waters 2000, Riley et al. 2006, Trombulak and Frissel 2000, and WSDOT 2012). The I-90 corridor also represents an additional barrier in that there is a "bottleneck" of suitable fisher habitat (see figures 2.1 and 2.2) along the interstate, thus reducing the likelihood of fishers finding and crossing the corridor. This barrier would greatly reduce the probability of fisher expanding from one reintroduction area to the other, and would probably result in substantial mortalities associated with I-90. For these reasons, this alternative would not meet the purpose, address the needs, or meet the objectives for action and was therefore dismissed from further analysis.

## Reintroduce Fishers through Captive Breeding

When OLYM developed a plan for reintroducing the fisher to the Olympics, the NPS and WDFW considered using captive breeding rather than translocation from a source population for supplying fishers for reintroduction. After evaluation, they found that captive breeding was both less effective and more expensive than capture and release reintroductions. When developing alternatives for this Plan/EA, the planning team again considered this alternative but dismissed it from further analysis for the following reasons.

1) Captive breeding of fishers has not been successfully undertaken, although it was attempted in the early 1900s when fisher pelt prices were astronomically high (Hodgson 1937; Larabee 1941). As a

process, the captive-breeding and captive-rearing of a non-trivial number of fishers is scientifically untested.

2) Captive breeding would either likely result in a) a loss of genetic diversity and accumulation of deleterious mutations and genetic adaptation to captivity among the introduced population or b) require a larger more-diverse initial population than required for a straight "catch and release" reintroduction in order to mitigate deleterious effects on the genetics of populations when bred in captivity (Frankham 2008; Woodworth et all 2002).
3) Captive-raised individuals typically have significantly lower survival rates following release than wild-caught individuals (Jule et al. 2008; Ralls et al. 1992).
4) To get an appropriate amount of genetic diversity to initiate a captive breeding project (related to #2 above) and enough fishers to not hinder survival rates (related to #3 above), project managers would still need to obtain a substantial number of founder fishers from another source population, thereby decreasing the only benefit of this alternative (reduced impacts to the source population). [It is noteworthy here that impacts to the source population has been dismissed from further analysis because capturing fishers for captive breeding or translocation would be compensatory for fishers that would have been harvested for their pelts rather than resulting in additional fisher mortality.]
5) Based on the analysis that OLYM completed, captive breeding would result in similar if not higher environmental impacts than a basic "catch-transport-then-release" translocation project (NPS 2007).
6) Captive breeding requires substantially more time to succeed. Many years of propagation would be required to be able to release a founder population of suitable size.
7) Captive breeding and rearing is considerably more complex than translocation, requiring substantial facilities; additional trained staff, supplies, and equipment; sufficient wild prey; and training for growing fishers. All of these requirements are expensive and would require a substantial increase in funding to include in a reintroduction project. In the plan developed for fisher reintroduction in the Olympics, the NPS estimated that captive breeding would cost approximately $700,000 more than reintroduction without captive breeding (based on a three year program to obtain optimal source population) (NPS 2007). Using these same estimates and assuming an additional two years of breeding (to obtain a larger source population of 160 fishers in comparison to 100 at OLYM), captive breeding would cost approximately $1,200,000 more than a translocation program in MORA and NOCA, for a total of close to $2,300,000. In comparison, Alternative B is estimated to cost approximately $1.1 million, a cost shared by WDFW, the NPS, and other agencies and organizations invested in the conservation of this species.

"The use of captive breeding in species has grown enormously in recent years but without a concurrent growth in appreciation of its limitations. Problems with (1) establishing self-sufficient captive populations, (2) poor success in reintroductions, (3) high costs, (4) domestication, (5) preemption of other recovery techniques, (6) disease outbreaks, and (7) maintaining administrative continuity have all been significant. The technique has often been invoked prematurely and should not normally be employed before a careful field evaluation of costs and benefits of all conservation alternatives has been accomplished and a determination made that captive breeding is essential for species survival…Captive breeding should be viewed as a last resort in species recovery and not a prophylactic or long-term solution because of the inexorable genetic and phenotypic changes that occur in captive environments" (Snyder et al 1996).

Ultimately, a captive breeding program, which is less scientifically sound than a translocation program, would cost substantially more than a translocation program, would take at least a year longer to implement, and would require additional and more complex federal actions beyond those described in Alternative B while reducing the likelihood of success (see quote above). For these reasons, captive breeding is primarily used as a last resort for populations at risk where an adequate number of founders are not available. That situation is not the case here, and therefore, while NPS *Management Policies 2006* permit the use of captive breeding for restoring a species to its native habitat, there is no need in this instance to consider such an expensive and risky endeavor to restore the fisher to the SW and NW Cascades of Washington State.

### Reintroduce Fishers through Soft Release

Most translocations have employed hard releases, i.e., releasing fishers immediately upon arriving at a release site. However, several translocations have used soft releases, whereby fishers are temporarily housed at the release site prior to release and attractants are placed at release sites (e.g., food, fisher scent) to encourage acclimation and fidelity to the reintroduction area (Davis 1983). While soft releases have been employed in a number of fisher translocations (Rego 1989, Roy 1991, Heinemeyer 1993, Proulx et al. 1994, Weir 1995) and may be valuable when translocating other species at risk, the type of release (i.e., hard vs soft) was not an influential factor for explaining the success of fisher translocations (Lewis et al. 2012). Because soft releases are more expensive and have not prevented extensive post-release movements by fishers, soft releases were dismissed from further consideration.

## A COMPARISON OF ALTERNATIVES AND THEIR ENVIRONMENTAL CONSEQUENCES

Action alternatives selected for analysis must address the stated purpose of taking action, resolve the need for action, and meet, to a large degree, all objectives as outlined in *Chapter 1: Introduction.*

Table 2.2 compares the no action and action alternative by summarizing the elements being considered, and Table 2.3 compares how each of the alternatives would meet the objectives as outlined in chapter 1. The environmental impacts, which are analyzed in detail in chapter 3, are summarized in Table 2.4.

**Table 2.2: Comparison of Alternatives**

| | Alternative A: No Action | Alternative B: Reintroduce Fishers into MORA and NOCA |
|---|---|---|
| **Fisher Restoration** | | |
| MORA | The NPS would take no action. WDFW would proceed with reintroduction in SW Cascades which is anticipated to eventually restore fishers to MORA. | Partner with WDFW to reintroduce fishers into MORA and NOCA and the surrounding NW and SW Cascades through translocations from populations closely related to fishers historically occurring in Washington. |
| NOCA | The NPS would take no action. Fisher would not be restored to NOCA. | |
| **Time Required to Reestablish a Self-Sustaining Fisher Population** | | |
| MORA | Due to WDFW actions, fishers could become restored in the SW Cascades and MORA in approximately 10 years. | Approximately 10 years in both the SW and NW Cascades. |
| NOCA | Fishers would not be restored in the NW Cascades or NOCA. | |
| **Fisher Reintroductions on NPS Lands** | | |
| MORA | No reintroduction on NPS lands. | Reintroduce fishers directly in MORA and NOCA. Two candidate releases sites have been identified in MORA; three sites have been identified in NOCA. |
| NOCA | No reintroduction on NPS lands. | |

| | Alternative A: No Action | Alternative B: Reintroduce Fishers into MORA and NOCA |
|---|---|---|
| **Monitoring** | | |
| MORA | If fisher immigrate to MORA in the early years following release, WDFW would monitor the reintroduced fishers for at least three years for signs of restoration. | Monitor the reintroduced fisher populations for at least six years (three in each area) to determine if a reproductive population was becoming established and would adaptively manage the reintroduction and monitoring process based on results. |
| NOCA | No monitoring would occur in the NW Cascades related to establishing a fisher population. | |
| **Adaptive Management** | | |
| MORA | N/A | Adapt reintroductions and monitoring protocols yearly based on monitoring results and the availability of fishers from the source population. |
| NOCA | N/A | |
| **Regulatory Considerations** | | |
| MORA | WDFW would handle all regulatory considerations. | Inspect fishers captured in Canada by a veterinarian and obtain a possession and export permit. Notify Canadian Customs agents in advance of fishers leaving Canada. Inspect fishers by veterinarian in accordance with regulations of the WDOA for an import permit. Notify US Customs agents in advance of fishers arriving into the U.S. Notify USFWS in advance of port of entry and declaration of importation. |
| NOCA | N/A | |
| **Visitor Use and Outreach** | | |
| MORA | Some interpretation materials may be developed if and when fisher are restored to MORA. | Implement education and interpretive measures including brochures, publications, and information on MORA and NOCA's websites about fisher biology, fisher ecology, and the restoration program. Seek opportunities and support to involve citizen science in the fisher reintroduction process. |
| NOCA | None associated with fisher restoration. | |
| **Total Implementation Costs** | | |
| NPS | None | ~$1,100,000 (Cost covered in part by NPS; WDFW and external funds also available) |
| Other | ~$550,000 | |

**Table 2.3: Summary Comparison of Alternatives on Project Purpose, Need, and Objectives**

| Project Objectives | Alternative A: No Action | Alternative B: Reintroduce Fishers into MORA and NOCA |
|---|---|---|
| 1. Establish Self-Sustaining Fisher Populations in both the SW and NW Cascades | *Partially meets objective:* WDFW would proceed with fisher restoration in the SW Cascades, but with limited flexibility as no action could be taken on NPS lands. There would be no fisher restoration in the NW Cascades. | *Fully meets objective:* Fishers would be reintroduced in both the SW and NW Cascades and would occupy suitable fisher habitat in the Cascades for an extended period of time. |
| 2. Establish founding fisher populations genetically similar to the extirpated populations | *Partially meets objective:* The source population for the SW Cascades would be the same as Alternative B. There would be no fisher restoration in the NW Cascades. | *Fully meets objective:* The source population for both the SW and NW Cascades would be taken from British Columbia (or if unavailable, Alberta), which are also closely related to fishers historically occurring in Washington. |
| 3. Facilitate the distribution of fishers throughout suitable | *Minimally meets objective:* Fishers may immigrate to MORA from release sites outside of the park and eventually | *Fully meets objective:* Fishers would be reintroduced within release sites in both MORA and NOCA. These release |

| Project Objectives | Alternative A: No Action | Alternative B: Reintroduce Fishers into MORA and NOCA |
|---|---|---|
| habitat in both Mount Rainier National Park and North Cascades National Park Service Complex | become distributed in MORA. However, restoration in MORA would be slower than Alternative B. There would be no fisher restoration in the NW Cascades. | sites have been identified based on suitable habitat. |
| 4. Expand scientific understanding and use such information to adaptively manage fisher restoration and guide and inform future conservation efforts | *Meets objective to a large degree:* Monitoring efforts would be led by WDFW and would focus on non-NPS lands in the SW Cascades. There would be no information gained from a second reintroduction in the NW Cascades. | *Fully meets objective:* Monitoring efforts, which would be completed in both the SW and NW Cascades would include determining survival, home range establishment, and reproductive success. |
| 5. Educate and inspire the public to become more involved in rare species conservation | *Minimally meets objective:* MORA may eventually develop interpretive materials about fisher and rare species conservation; however, NPS visitors and constituents would not be involved in reintroduction efforts. There would be no fisher restoration or associated education and outreach in the NW Cascades. | *Fully meets objective:* Information would be widely distributed by the NPS about fisher restoration. Opportunities for public participation in reintroductions and/or monitoring efforts would be maximized. Interpretive programs would be developed about fishers and rare species conservation. |

**Table 2.4: Summary of Comparison of Alternatives on Environmental Consequences**

| Resource | Alternative A: No Action | Alternative B: Reintroduce Fishers into MORA and NOCA |
|---|---|---|
| **Species of Special Concern** | | |
| Fisher | The goals of the Washington State Recovery Plan for the Fisher would not be met and the species would remain listed as state endangered. A successful fisher restoration in the SW Cascades and MORA would have a moderate beneficial impact on the West Coast DPS fisher population as a whole because reintroduction would result in improvements to population size and long-term viability of the species. | The fisher would experience long-term, moderate, beneficial effects from increasing the size and expanding the geographic range of this species. Restoration would also contribute to meeting state recovery goals and could result in the downlisting the species from its endangered status in Washington. Previously released fishers may experience some direct, short-term, adverse, negligible impacts from reintroductions and monitoring efforts. |
| Canada lynx | No effect beyond current conditions. The Canada lynx is considered extirpated from MORA; no action in or around NOCA. | Although impacts to Canada lynx and critical lynx habitat would be adverse, negligible, and long-term, these impacts would be unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect Canada lynx and designated Critical Habitat. |
| Cascade Red Fox | Same as Alternative B (adverse and long-term, ranging from negligible to minor), but slightly delayed. | Since adverse impacts associated with Alternative B to Cascade red foxes and their habitat would be too small to measure or measurable but not outside the natural range of variability, overall adverse impacts would be short- to long-term and negligible to minor. |
| Gray wolf | No effect beyond current conditions. The gray wolf is considered extirpated from MORA; no action in or around NOCA. | Although impacts to gray wolves would be adverse, negligible, and long-term, these impacts would be unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect gray wolves. |
| Grizzly bear | No effect beyond current conditions. The grizzly bear is considered extirpated from MORA; no action in or around NOCA. | Although impacts to grizzly bears would be adverse, negligible, and long-term, these impacts would be unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect grizzly bears. |
| Marbled murrelet | Same as Alternative B (none to negligible, adverse, and long-term), but slightly delayed. | Although impacts to marbled murrelets would be adverse, negligible, and short- to long-term, they are unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect marbled murrelets. |
| Northern Goshawk | Same as Alternative B (adverse and long-term, ranging from negligible to minor), but slightly delayed. | Since adverse impacts associated with Alternative B to northern goshawks and their habitat would not be measurable or measurable but not outside the natural range of variability, and impacts would not affect nesting periods or habitat (where they may be most vulnerable), overall adverse impacts would be short- to long-term and negligible to minor. |
| Northern spotted owl | Same as Alternative B (none to negligible, adverse, and long-term), but slightly delayed. | Although impacts to the northern spotted owl would be adverse, negligible, and short- to long-term, they are unlikely to occur. This alternative may affect but would not likely adversely affect northern spotted owls. |

| | | |
|---|---|---|
| Pileated Woodpecker | Same as Alternative B (adverse and long-term, ranging from negligible to minor), but slightly delayed. | Since adverse impacts associated with Alternative B to pileated woodpeckers and their habitat would be too small to measure or would be measurable but not outside the natural range of variability, and impacts would not affect nesting periods or habitat, overall adverse impacts would be short- to long-term and negligible to minor. |
| Western Gray Squirrel | No effect beyond current conditions. Western grey squirrels are not present in MORA; no action in or around NOCA. | Since adverse impacts to the western gray squirrel and their habitat would be too small to measure or measurable but not outside the natural range of variability, overall adverse impacts would be short- to long-term and negligible to minor. |
| Wolverine | No effect beyond current conditions. The wolverine is considered extirpated from MORA; no action in or around NOCA. | Although impacts to the wolverine would be adverse, negligible, and long-term, they are unlikely to occur. |
| Migratory Birds | Same as Alternative B (none to negligible, adverse, and long-term), but slightly delayed. | While fishers may prey on individual birds, fisher predation on migratory birds would have an overall negligible adverse long-term impact on migratory bird populations as a whole. |
| **Wildlife and Wildlife Habitat** | | |
| Wildlife and Wildlife Habitat | No additional impacts to wildlife and wildlife habitat in NOCA beyond current conditions. Alternative A would have delayed but similar impacts on wildlife as Alternative B. Therefore, adverse impacts from Alternative A to wildlife in MORA would be long-term and minor, and beneficial impacts would be long-term, and negligible to minor. | Adverse impacts to fisher prey in MORA and NOCA would be long-term and minor, while beneficial impacts to fisher predators would be long-term and negligible. Impacts to the overall ecosystem from the restoration of the fisher are expected to be beneficial, long-term, and negligible to minor, as native predator-prey relationships would be more fully restored while sufficient habitat would remain functional to maintain viability of all species. |
| **Wilderness** | | |
| Untrammeled Quality | Short-term, negligible to minor, adverse impacts on the untrammeled quality of the Mount Rainier Wilderness due to fisher restoration actions and the potential presence of tracking devices on wild animals within wilderness. There would be no impacts to the Stephen Mather Wilderness from this alternative. | Short-term, negligible to minor adverse impacts on the untrammeled quality of the Mount Rainier and Stephen Mather Wildernesses due to fisher restoration actions and the presence of tracking devices on wild animals within wilderness. |
| Natural Quality | Minor long-term beneficial impacts to the natural quality of the Mount Rainier Wilderness from fisher restoration. Existing adverse impacts to the natural quality of wilderness character in the Stephen Mather Wilderness would perpetuate into the future from the continued absence of fishers within the wilderness ecosystem. | Minor long-term beneficial impacts to the natural quality of the Mount Rainier and Stephen Mather Wildernesses from fisher restoration. |
| Undeveloped Quality | Adverse, short-term, negligible to minor impacts to the undeveloped quality of the Mount Rainier Wilderness from the presence of tracking devices in/on fishers and WDFW weekly telemetry flights with fixed wing aircraft. There would be no impacts to the Stephen Mather Wilderness. | Adverse, short-term, minor impacts to the undeveloped quality of wilderness character of both wildernesses would occur from monitoring efforts tied to the presence of fisher, including tracking devices in/on fishers, telemetry flights with fixed wing aircraft, and camera and hair snare stations. |

| | | |
|---|---|---|
| Opportunities for Solitude or Primitive Recreation | Discussed under *Acoustic Environment / Soundscapes* and *Visitor Use and Experience*. | Discussed under *Acoustic Environment / Soundscapes* and *Visitor Use and Experience*. |
| Other Features of Value | Minor, long-term beneficial impacts from increased scientific understanding of reintroduction efforts. Little to no educational opportunities would be improved in the Mount Rainier Wilderness under this alternative. There would be no impacts to the Stephen Mather Wilderness from this alternative. | Minor, long-term beneficial impacts from increased scientific understanding of reintroduction efforts. Negligible to minor beneficial impacts from enhanced education and outreach in and around both wildernesses. |
| **Acoustic Environment / Soundscapes** | | |
| Acoustic Environment / Soundscapes | Increase in overflights and noise generated by fixed-wing aircraft would result in adverse, short-term, negligible to minor impacts on the acoustic environment and soundscapes at MORA. There would be no effect to the existing acoustic environment or soundscapes in NOCA from fisher reintroduction. | Reintroduction activities would have a negligible, short-term, adverse impact on the acoustic environment. Increase in overflights and noise generated by fixed-wing aircraft would result in adverse, short-term, minor impacts on the acoustic environment and soundscapes at MORA and NOCA. |
| **Visitor Use and Experience** | | |
| Visitation | No anticipated impacts to visitation at either NOCA or MORA from implementing this alternative, and little to no opportunity to increase the visibility of these two national parks. | No impacts to visitation at either NOCA or MORA are anticipated from this alternative. Negligible, short-term, beneficial impacts from increased visibility of MORA and NOCA. |
| Recreation Resources | Negligible, short-term, adverse impacts from potential area closures that could be needed to enable successful establishment of a founding population. These impacts are extremely unlikely to occur. No recreation resources would be impacted in NOCA under Alternative A. | Negligible, short-term, adverse impacts from potential area closures that could be needed to enable successful establishment of a founding population. These impacts are unlikely to occur and are not expected at this time. |
| Education and Outreach | Beneficial, short-term, and negligible impacts from the potential to focus interpretation efforts on species restoration and forest carnivores at MORA. Beneficial, short-term, negligible to minor impacts from increased and enhanced opportunities for public involvement with monitoring fishers at MORA. There would be no impact to education and outreach opportunities in NOCA under this alternative. | Beneficial, short-term, and negligible impacts from the potential to focus interpretation efforts on species restoration and forest carnivores at MORA and NOCA. Beneficial, short-term, negligible to minor impacts from increased and enhanced opportunities for public involvement with fisher restoration at MORA and NOCA. |
| Public Values concerning Fisher Reintroduction | Those who value a restored ecosystem and/or the recreational /aesthetic values of fisher restoration would experience beneficial, long-term, negligible to minor impacts from fisher restoration in the SW Cascades. As no restoration would occur in the NW Cascades, these individuals would continue to be negatively impacted by the absence of fishers in the NW Cascades.<br>Those who regard fisher reintroduction as undesirable and associate negative aesthetic, ecological, and recreational values with the program would experience adverse, long-term, minor impacts from reintroduction efforts in the SW Cascades. | Those who value a restored ecosystem and/or the recreational /aesthetic values of fisher restoration would experience beneficial, long-term, negligible to minor impacts from fisher restoration in the SW and NW Cascades.<br>Those who regard fisher reintroduction as undesirable and associate negative aesthetic, ecological, and recreational values with the program would experience adverse, long-term, minor impacts from reintroduction efforts in the SW and NW Cascades. |

| | | |
|---|---|---|
| **Neighboring Landowners, Land Use, and Socioeconomics** | | |
| Neighboring Landowners | Impacts to neighboring landowners, land use, and socioeconomics in the SW Cascades would be similar to those from Alternative B. Although unlikely, neighboring USFS, WDNR, and private timber lands surrounding MORA could individually experience long-term, negligible to moderate, adverse impacts and long-term, beneficial, negligible impacts from fisher restoration in the SW Cascades. Other neighbors with domestic animals or livestock near MORA could experience long-term, negligible, adverse impacts from potential fisher predation.<br>There would be no impacts to neighboring landowners, land use, or socioeconomics in the NW Cascades from Alternative A as no fisher would be reintroduced in the region. | Although rare and unlikely, neighboring landowners who manage their lands for timber production could individually experience long-term, negligible to moderate, adverse impacts if seasonal restrictions are placed on certain activities that have the potential to adversely impact fisher. While these restrictions could delay activities such as timber harvesting and associated activities, the potential for and impact from any restriction would be largely reduced by fisher behavior and limited monitoring.<br>These neighboring lands could also experience long-term, beneficial, negligible impacts to land use and socioeconomics from fisher restoration due to fisher predation on other mammals that can decrease the productivity of forestry lands, such as the mountain beaver and porcupine.<br>Other neighbors with domestic animals or livestock near MORA and NOCA could experience long-term, negligible, adverse impacts from potential fisher predation. |
| **Park Management** | | |
| Park Management | This alternative would not impact NOCA; however impacts to MORA would likely be short- to long-term, adverse, and negligible. | This alternative would require NPS funding and staff time that could divert of resources away from other priorities and would require oversight for future planning efforts in order to ensure the protection of the fisher and fisher habitat. Overall, these impacts would be adverse, short- to long-term, and negligible to minor. |

## THE ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The Council on Environmental Quality (CEQ) regulations implementing NEPA and the National Park Service NEPA guidelines require that "the alternative or alternatives which were considered to be environmentally preferable" be identified (CEQ Regulations, section 1505.2). Environmentally preferable is defined as "the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (46 FR 18026–46 FR 18038)." In accordance with the criteria outlined in NEPA and DO-12, an Environmentally Preferable Alternative meets the following criteria: (1)Fulfills the responsibilities of each generation as trustee of the environment for succeeding generations; (2) Ensures for all Americans, safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) Attains the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences; (4) Preserves important historic, cultural, and natural aspects of national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice; (5) Achieves a balance between population and resource use that would permit high standards of living and wide sharing of life's amenities; and (6) Enhances the quality of renewable resources and approach the maximum attainable recycling of resources.

Alternative A (No Action) would not meet any of the criteria above relative to the action alternative because further fisher restoration would not occur in the NW Cascades and the flexibility required to ensure a successful restoration of the fisher in the SW Cascades would not be maximized as reintroductions would not be allowed on NPS land. Thus, this alternative would not best fulfill the responsibilities of each generation as a trustee of the environment for succeeding generations (#1), nor would it best protect, preserve, or enhance natural resources (#4). It would also fail to attain the widest range of beneficial uses of the environment (#3) as the fisher would continue to be extirpated from the NW Cascades.

In comparison, Alternative B would meet all of the criteria above, with limited impacts to the biological and physical environment, and is therefore the Environmentally Preferable Alternative for this project. The proposed reintroductions in this alternative would fulfill the responsibilities of each generation as trustee of the environment for succeeding generations (#1) and achieve a balance between population and resource use (#5) by restoring a species to its historic range that was once extirpated due primarily to human action. It would preserve important natural aspects of national heritage and maintain an environment that supports diversity (#4) by restoring ecological diversity within and surrounding MORA and NOCA, and in so doing, it would attain the widest range of beneficial uses of the environment (#3). This alternative would also ensure for all Americans, safe, healthful, productive, and aesthetically and culturally pleasing surroundings (#2) in providing opportunities for visitors to experience a native carnivore in its natural environment.

Although Alternative A is believed to cause the least amount of damage to the biological and physical environment, Alternative B best protects, preserves, and restores natural resources in both MORA and NOCA while impacting resources only slightly more than Alternative A. Because of this and the alternative's alignment with the criteria above, Alternative B is considered the Environmentally Preferable Alternative. Alternative B is also the Preferred Alternative because it best meets all of the objectives identified in the purpose and need (chapter 1) of this analysis.

# Chapter 3 - Affected Environment and Environmental Consequences

This chapter provides a description of the existing conditions of specific resources that would be affected by the alternatives if implemented and the likely environmental consequences from implementing either the no action or action alternative described in chapter 2. This chapter is organized by resources/impact topics that were derived from internal and public scoping (see *Issues and Impact Topics* on page 15) and includes: species of special concern; wildlife and wildlife habitat; wilderness; acoustic environment / soundscapes; visitor use and experience; neighboring landowners, land use, and socioeconomic conditions; and park management and operations.

## IMPACT ASSESSMENT

### Methodology

For each impact topic, this chapter analyzes the direct, indirect, and cumulative impacts, both adverse and beneficial, that would be anticipated over the course of the next ten years for each of the management alternatives considered. To do so, the impacts of each alternative on each resource are identified, and the nature, duration, and intensity of impacts are determined (see *Table 3.1 Definitions of Determinations of Effect* for definitions of these terms). Overall, the NPS impact analyses and conclusions were based on the review of existing literature and park studies, information provided by experts within the park and other agencies, professional judgment and park staff insights, and public input.

**Table 3.1: Definitions of Determinations of Effect**

| Impact | Definition |
|---|---|
| **Type of Impact** | |
| Direct | Impacts would occur as a direct result of fisher reintroduction actions. |
| Indirect | Impacts would occur from fisher reintroduction actions and would occur later in time and/or farther in distance from the action but are still reasonably foreseeable. |
| **Nature of Impact** | |
| Adverse | Impacts would move the system away from a desired condition. |
| Beneficial | Impacts would move the system toward a desired condition. |
| **Duration of Impact** | |
| Short-term | Impacts would occur during fisher reintroductions or last up to three years following last fisher release. |
| Long-term | Impacts would last longer than three years following fisher release. |
| **Intensity of Impact** | |
| Negligible | Negligible impacts are imperceptible or too small to measure or detect. |
| Minor | Minor impacts are slightly perceptible or measurable and limited in extent. Without further actions, impacts would be temporary and the resource would return to the previous condition. |
| Moderate | Moderate impacts are readily apparent and measurable but limited in extent. Without further actions, impacts would be temporary and the resource would return to the previous condition. Individuals of a species would be harmed or killed, with slightly measurable impacts to the population or surrounding community. |
| Major | Major impacts are substantial and measurable, highly noticeable, and affecting a large area. Changes would not reverse without active management. Entire communities of species would be measurably affected. |

This Plan/EA also uses the terminology in *Table 3.2: Definitions of Intensity of Impact for Species of Special Concern* to describe potential intensity of impacts to federally listed species of wildlife.

**Table 3.2: Definitions of Intensity of Effect for Federally Listed Species**

| Intensity of Impact | Definition |
|---|---|
| No Effect | When a proposed action would not affect a listed species or designated critical habitat. |
| May affect / not likely to adversely affect | Effects on federally listed species are insignificant or discountable (i.e., not able to be meaningfully measured, detected, or evaluated, or extremely unlikely to occur) or are completely beneficial. |
| May affect / likely to adversely affect | When an adverse impact to a federally listed species may occur as a direct or indirect result of proposed actions and the effect is not discountable or beneficial. |
| Is likely to jeopardize a species and/or adversely modify critical habitat | The appropriate conclusion when the NPS or the U.S. Fish and Wildlife Service identifies situations in which the proposal would jeopardize the continued existence of a listed species or adversely modify critical habitat to a species within or outside the boundaries of MORA and/or NOCA. |

## Cumulative Impacts

This analysis also includes a discussion of cumulative impacts to each impact topic. Cumulative effects are the "additive" impacts from past, present, or reasonably foreseeable management actions. Considering the scope and duration of the action alternative, the planning team for this Plan/EA identified the following past, present, or reasonably foreseeable future actions in Mount Rainier National Park (MORA) and North Cascades National Park Service Complex (NOCA) or the surrounding region that might contribute to cumulative impacts. The temporal scope includes future projects within a range of approximately ten years.

### Past Actions

Past actions include activities and events that have influenced the current condition of the environment in the project area.

- Mount Rainier National Park was designated in 1899; North Cascades National Park Service Complex was designated in 1968. The Mount Rainier Wilderness in MORA and the Stephen Mather Wilderness in NOCA were designated in 1988.
- The total area of old-growth forest in Washington declined by 70 percent between the early 1930s and the early 1990s (Bolsinger and Waddell 1993).
- The fisher was likely extirpated from the state for various reasons, including over exploitation from commercial trapping and habitat fragmentation. The fisher has been protected from commercial harvest and trapping since 1934, but the species has not recovered.
- Body-gripping traps, which can injure or kill fishers caught incidental to trapping for other species, have been banned in the state since 2000 (Initiative 713; see RCW 77.15.194).
- The fisher was listed as a state endangered species in 1998 and listed as a federal candidate species in 2004 (USFWS 2004b).
- WDFW conducted a feasibility study for reintroducing fishers to the state in 2004 and developed a state recovery plan for the fisher in 2006 (Lewis and Hayes 2004; Hayes and Lewis 2006).
- Through a partnership between WFDW and Olympic National Park, 90 fishers were reintroduced to the Olympic Peninsula between 2008 and 2010. Monitoring associated with this effort, which is ongoing, has shown some initial indications of success (Happe et al. 2014)

- WDFW completed an implementation for reintroducing the fisher to the SW and NW Cascades, which was completed in 2013 (Lewis 2013).
- The Washington Department of Natural Resources (WDNR) developed a multispecies habitat conservation plan in 1997 (WDNR 1997) to continue forest management activities on state trust lands while protecting the habitat of several threatened and endangered species.

### Current and Reasonably Foreseeable Future Actions

#### *National Park Service*

**Ongoing Management Activities**
**Trail Maintenance.** The maintenance of extensive hiking trails occurs at both parks on an annual basis. These activities include brushing and trail clearing, construction or replacement of minor trail bridges, and the eradication of social trails.

**Cyclic road maintenance and plow operations (MORA primarily).** Both MORA and NOCA are responsible for maintaining park roads; although MORA has the additional responsibility of plowing during the winter months. These activities include brushing, re-grading gravel roads, ditch cleaning, removal of woody debris/logs and live vegetation to promote drainage, invasive plant removal, and snow plowing.

**Natural Resources Management.** Activities related to resource management include monitoring wildlife (e.g., elk, northern spotted owls, bull trout, amphibians, and landbirds), monitoring forest processes and landscape change, rehabilitation of wilderness camping areas, exotic plant species removal, and restoration projects, some of which entail helicopter flights.

**Hazard Tree Management.** Both MORA and NOCA monitor and treat hazard trees within designated areas of the parks to protect visitors, staff, and facilities. These hazard tree removal programs at MORA and NOCA have the potential to remove habitat trees for northern spotted owls, bald eagles, and marbled murrelets, and mitigations have been put in place at both parks to ensure protection of these species. Other methods, such as closures around hazard trees, are utilized to protect the public.

**Implementation Plans at MORA**
**Carbon River Access Management (2010).** This plan reduces vehicle access to the Carbon River following extensive flooding.

**Hazard Tree Management Plan (2010).** Approximately two hundred or more trees are treated each year, most of which are adjacent to developed areas. There is limited treatment at backcountry camps in the park.

**Nisqually-Paradise Road Rehabilitation (2013).** MORA is currently repairing about 20 miles of Nisqually-Paradise Road because of deteriorating road conditions and structural deficiencies. Construction on the Nisqually to Paradise Road may extend into 2017. The project will have very limited impact on adjacent vegetation, and no impact on fisher habitat. The primary impact to adjacent resources from construction activities is noise.

**Implementation Plans at NOCA**
**Stehekin River Corridor Implementation Plan (2013).** NOCA is moving forward with implementing a reroute of the lower Stehekin Valley Road, and associated actions, to avoid future impacts from

flooding. This action will entail the removal of some forest habitat within the lower Stehekin Valley. Construction is planned to begin in spring 2015 and will extend for two years.

**Invasive Plant Management Plan (2011).** Through the implementation of this plan, NOCA has begun to treat several populations of invasive plants with manual and herbicide treatments. On the westside of the Cascades, most of these treatments are in developed areas such as gravel pits, roads, and the Marblemount Ranger Station; however a few treatments extend up the Big Beaver drainage, along Ross Lake and the lower Skagit River, and through backcountry trails throughout the park.

**Fire Management Plan (2010).** This plan assumes that an average of 200 acres will burn each year as a result of lightning ignitions that would be allowed to burn for the benefit of the resources and an average of 260 acres will burn each year as suppression fires, i.e., unwanted fires that are actively extinguished by fire management staff. Additionally, up to 5,219 acres are planned for thinning and/or prescribed fires near Hozomeen (north end of Ross Lake) and another 4,248 acres are planned for thinning and/or prescribed fires near Stehekin, on the eastside of the Cascades.

**Mountain Lakes Fisheries Management Plan (2008).** The primary actions associated with this plan entail removing non-native, reproducing populations of fish, via gillnetting or piscicide, from 36 lakes within NOCA. While few lakes are treated each year, treatments often require helicopter flights to treated lakes for the transport of materials.

#### *U.S. Forest Service*

**Northwest Forest Plan (1994).** The USFS's Northwest Forest Plan (USDA and USDI 1994) is a comprehensive strategy designed to provide for the conservation of late-successional forest species, including the northern spotted owl, while at the same time providing a predictable level of forest products for commercial harvest for National Forest System lands in Washington, Oregon, and California. The plan's strategies meet the conservation obligations for the spotted owl and other protected species, while allowing for a stable and sustainable supply of timber.

**Invasive Plant Treatments.** The USFS has plans to treat invasive plants across 3,308 acres of known infestations in the Mount Baker-Snoqualmie National Forest (USFS 2005) and 2,700 acres of known infestations in the Gifford-Pinchot National Forest (USFS 2008). In 2013, Mount Baker-Snoqualmie National Forest treated 1,035.6 acres for invasive plant management (USFS 2013). In 2009, the USFS treated 2,513 acres in the Gifford-Pinchot National Forest for invasive plants and another 1,168 acres to specifically improve elk forage (USFS n.d.(b)).

#### *State and Local Government*

**WDNR Habitat Conservation Activities.** The WDNR has developed a multispecies habitat conservation plan to continue forest management activities on state trust lands while complying with the federal Endangered Species Act (WDNR 1997). Details about this plan are included under *Neighboring Landowners, Land Use, and Socioeconomics* later in this chapter.

**County Comprehensive Plans.** Most of the unincorporated lands surrounding MORA and NOCA are designated as natural resource lands under the Washington State Growth Management Act and are further classified as either public open space (other publics lands and/or wilderness areas); industrial, commercial, or rural forest; or agricultural lands as part of the land use element of the county comprehensive plans. Some rural lands are designated as rural reserve/rural residential, with densities averaging between 1 residential unit per 5 acres to 1 unit per 20 acres (Skagit County 2007; Whatcom County 2014, Lewis County 2002, Pierce County 2014). Some lands are also open for mineral

development near the park boundaries. These designations, and the applicable development regulations and comprehensive plan policies, help manage growth and maintain the rural character of the communities adjacent to the parks.

***Other***

**Climate Change.** Based on a wide body of scientific data and analysis, global climate change is occurring and is driven by both natural and anthropogenic forces, particularly by the increase in the atmospheric concentration of CO2 since the mid-18th century (IPCC 2013). According to the U.S. Global Change Research Program, the average annual temperature in the northwest will increase by 3.3°F to 9.7°F by 2070 to 2099, with the largest increases during the summer months (Mote et. al. 2014). These changes in temperature will likely be accompanied by changes in precipitation patterns as well, with a projected decrease in summer precipitation in the northwest by as much as 30 percent by the end of the century (Mote et. al. 2014). Climatologists project that the snow water equivalent (the liquid content of snowpack) will decrease substantially the Washington Cascades – up to 46 percent – by the 2040s, and the watersheds of both MORA and NOCA are projected to shift from snow dominant watersheds to transient (mix of snow and rain) by as early as the 2040s (Strauch et. al. 2013). Due to these projected increases in temperature and changes in precipitation patterns tied to global climate change, the Pacific Northwest can expect to see significant changes to species distributions and phenologies, with cascading effects on ecological communities (Lawler et al. 2012; Mawdsley et al. 2009; West et al. 2009; Lawler et al. 2009). Climate-driven factors such as temperature extremes, drought, water stress, insect and disease outbreaks, and changes in fire frequency and forest structure, and their complex relationships, are expected to impact future fisher habitat and that of its prey and predators throughout the species' current and future range (Burns et al. 2003; Lawler et al. 2012, 379; Krohn 2012; Naney et al. 2012). However, Lawler et al. (2012) projects that the fisher will experience small climate-driven range expansions in some portions of the United States, including the Washington Cascades. In fact, as climate change is more likely to have greater effects on species at the edge of their range (Naney et al. 2012), more southerly populations (e.g. California) are likely to be more imperiled, thus increasing the conservation importance of more northerly populations such as those restored to Washington.

## GENERAL PROJECT SETTING

### Mount Rainier National Park

The area containing current Mount Rainier National Park (MORA) was proclaimed the Pacific Forest Reserve by President McKinley in 1893. By 1898, the Reserve was withdrawn from settlement, and Mount Rainier National Park was created on March 2, 1899 as the nation's fifth national park. Today, MORA encompasses (within legislative Park boundary) approximately 236,381.49 acres of west-central Washington, on the western slope of the Cascade Range (approximately 140 additional acres lies outside the legislative boundary of the park). In 1988, Congress also designated the Mount Rainier Wilderness, which accounts for approximately 97 percent of the park. About 88 percent (207,210 acres) of the designated park, plus the additional 140 acres outside the current boundary, lies within Pierce County, and 12 percent (29,171 acres) lies within Lewis County. The park's northern boundary is approximately 65 miles southeast of the Seattle-Tacoma metropolitan area and 65 miles west of Yakima. The elevations of the park extend from about 1,700 feet above sea level to 14,410 feet at the summit of Mount Rainier.

The focal point of the park is a towering, snow- and ice-covered volcano, which is a prominent landmark in the Pacific Northwest. The base of the volcano spreads over an area of about 100 square miles. The 26 major glaciers on the mountain cover 35 square miles, constituting the largest single-

mountain glacial system in the contiguous 48 states. Mount Rainier is also the second most seismically active and the most hazardous volcano in the Cascade Range.

The park's rugged, precipitous topography consists mainly of peaks and valleys. The flanks of the mountain are drained by five major rivers and their tributaries. The park's vegetation is diverse, reflecting the varied climatic and environmental conditions encountered across the park's 12,800-foot elevation gradient. Approximately 964 vascular plant species and more than 260 nonvascular plant species have been identified in the park. Mount Rainier also provides habitat for many wildlife species, including approximately 300 species of native birds, mammals, reptiles, amphibians, and fish.

Development and construction of roadways, buildings, and trail systems still in use today began during the late 1800s and peaked during the 1920s and 30s. Early 1900s mining operations in the Nisqually, Carbon, and White River drainages also maintained rights to dig, divert water, cut timber, and build structures. Forest management practices at the time included wildfire suppression, removal of dead wood, and prevention of public "vandalism" to living trees, underbrush, and wildflowers, especially in heavily used subalpine areas such as Paradise Valley (Catton 1996).

Early wildlife management at Mount Rainier focused on the health of deer and elk populations, plus high elevation requisite species like mountain goats, pika, and ptarmigan. Winter hunting and trapping of predators was commonplace and encouraged into the 1920s, with park rangers permitted to sell skins and furs to supplement their income. During February and March of 1914, Superintendent Ethan Allen reported that park staff had killed two cougars, two bobcat or lynx, and twenty-five marten (USDI 1915, 780). In 1923, MORA naturalist Floyd Schmoe highlighted the prevailing attitude toward members of the weasel family by noting they "…should be classed among our most destructive predatory animals as they doubt do more damage to small wild life than any other animal." (NPS 1923).

As perceptions in forest and wildlife management changed over time, great effort was made to protect Mount Rainier's natural and cultural resources without prejudice. Since the Mount Rainier Wilderness was designated in 1988, little development has taken place aside from maintenance and improvement to existing infrastructure. Maximizing visitor use while minimizing resource damage, re-vegetation of impacted areas, and invasive species control have been common practice in recent years.

## North Cascades National Park Service Complex

North Cascades National Park Complex (NOCA) is comprised of North Cascades National Park and Ross Lake and Lake Chelan National Recreation Areas – a complementary suite of protected lands that were designated by Congress in 1968 and united by a contiguous wilderness overlay, the Stephen Mather Wilderness, in 1988 that now represents nearly 93 percent of the park complex. Encompassing approximately 681,700 acres of land, NOCA is located in the northern Cascade Range of Washington State along the Canadian border, approximately 100 miles northeast of the Seattle-Tacoma metropolitan area. The park complex spans three counties – Whatcom (414,495 acres, 61 percent) and Skagit (129,585 acres, 19 percent) Counties on the western slope of the Cascades and Chelan County (136,556 acres, 20 percent) on the eastern slope of the Cascades – and is represented by the 2$^{nd}$ and 4$^{th}$ congressional districts.

Prior to its designation as a national park in 1968, NOCA was managed as a Forest Reserve/National Forest under the management of the USFS (Washington Forest Reserve designated in 1897). Between the late 1800s and mid-1900s, a number of rail lines, logging roads, mines, and associated developments (including homesteads and towns like the community of Stehekin, now located in Lake Chelan National

Recreation Area) were established within current park boundaries to harness the area's fur, timber, and mining resources, and fire suppression was a regular practice. Many of the trails and backcountry shelters that exist in the park today were established during this time and were associated with fur, timber, and mining exploitation.

The history of trapping in the park is of particular relevance to this planning effort and proposed action. The first documented white fur trader in the North Cascades dates back to 1811, but the heyday of this activity was markedly between the late 1800s through 1930, when settlers along the Skagit and Stehekin Rivers used trapping to supplement "their meager wilderness existence" (NPS 1986, 175). During this time, "hardy individuals working alone or in pairs would set up trap lines along ridges and in river bottoms" of the Skagit and Cascades Rivers and drainages in the NW Cascades (NPS 1986, 175). According to the *Historic Resource Study for North Cascades National Park Service Complex*, Bacon Creek, Goodell Creek, Thunder Creek, Big Beaver and Little Beaver Creeks, Hozomeen Creek, Lighting Creek, and Fisher Creek were all trapped for beaver, mink, otter, marten, coyote, fox, and lynx, whose pelts were often sold for cash (NPS 1986).

The biggest developments in NOCA to date are related to the construction and operation of three hydroelectric dams along the Skagit River in what is today Ross Lake National Recreation Area: Gorge Dam, constructed from 1921-1924 (rebuilt in 1961); Diablo Dam, constructed from 1927-1930; and Ross Dam, constructed from 1937-1953. In addition to the powerhouses, dams, and reservoirs associated with these projects, two company towns were also established during this construction window and remain today: Diablo and Newhalem.

Since NOCA's designation in 1968, lands within NOCA have been managed to protect their natural and cultural resource protection, wilderness character (particularly since the designation of the Stephen Mather Wilderness in 1988), and visitor use and experience. Very little development, outside a visitor center in the town of Newhalem, an environmental learning center on the shores of Diablo Lake, and some short frontcountry trails, has occurred under the management of the National Park Service. The only road that bisects NOCA is State Route 20, which was built in 1964.

Today, NOCA encompasses a vast "sea of peaks" replete with over 300 glaciers, saw-toothed granite pinnacles, a myriad of creek and riverine systems, and vast expanses of wilderness. Its rugged topography is home to a multitude of plant, wildlife, and fish species. Rare lichens, ancient cedars, Chinook salmon, bald eagles, marmots, mountain goats, and some 1,600 identified species share this diverse and expansive landscape. Human evidence spans nearly 10,000 years of habitation, use, and technological development.

## SPECIES OF SPECIAL CONCERN

### Issues and Concerns

Reintroducing fishers in an area where they no longer exist could affect other listed species through competition for forest cover and prey, predation, and introduction or spread of disease. Approximately fifteen federally-listed and 34 state-listed animal species (endangered, threatened, candidate, and other species of concern) occur in suitable fisher habitat in MORA and NOCA and surrounding lands that could become inhabited by fishers. Due to competition, disease, and predation, alternatives in this plan could have some impact on special status wildlife and migratory birds and are therefore analyzed in this assessment. In addition, reintroducing fishers would have a beneficial effect on the species itself by creating additional populations in Washington State and meeting long-term recovery goals.

## Affected Environment

MORA and NOCA support and protect a number of federal and state listed threatened and endangered species, a number of which could be impacted by the actions proposed in this Plan/EA (see *Table 3.3: State and Federal Listed Species in MORA and NOCA*). During internal scoping it was determined that of the federal and state listed species found in MORA and NOCA, eleven may be affected by fisher restoration in the parks — the fisher, Canada lynx, Cascade red fox, gray wolf, grizzly bear, marbled murrelet, northern goshawk, northern spotted owl, pileated woodpecker, western gray squirrel, and wolverine, which are described in more detail below. This analysis also includes information on migratory birds. The remainder of the species of special status found in the parks (see Table 3.3) would not be affected because (1) they use different habitats than fishers, (2) they have different food requirements, or (3) fishers either do not prey on these species, or prey on them only extremely rarely; therefore, these species are not discussed further in this section.

**Table 3.3: State and Federal Listed Species in MORA and NOCA**

| **Species** | **Species Status** | | **Park** | | **Effect** |
|---|---|---|---|---|---|
| Common Name (*Scientific Name*) | State | Federal | MORA | NOCA | |
| **Mammals** | | | | | |
| Canada lynx (*Lynx canadensis)* | ST | FT | Extirpated | X | NLAA |
| Cascade red fox (*Vulpes vulpes cascadensis)* | SC | none | X | ? | Neg-Minor Adverse |
| Fisher (*Pekania pennanti*) | SE | FC | Extirpated | Extirpated | Moderate Beneficial |
| Gray wolf (*Canis lupus)* | SE | FE | Extirpated | X | NLAA |
| Grizzly bear *(Ursus arctos)* | SE | FT | Extirpated | X | NLAA |
| Keen's myotis (*Myotis keenii)* | SC | none | X | | None |
| Townsend's big-eared bat (*Corynorhinus townsendii)* | SC | FCo | X | X | None |
| Western gray squirrel (*Sciurus griseus)* | ST | none | | X | Neg-Minor Adverse |
| Wolverine (*Gulo gulo)* | SC | none | Extirpated | X | Negligible Adverse |
| **Birds** | | | | | |
| American white pelican (*Pelecanus erythrorynchos)* | SE | none | | X | None |
| Bald eagle (*Haliaeetus leucocephalus)* | SS | FCo | X | X | None |
| Black-backed woodpecker (*Picoides arcticus)* | SC | none | X | X | None |
| Common loon (*Gavia immer)* | SS | none | | X | None |
| Ferruginous hawk (*Buteo regalis)* | ST | none | | X | None |
| Flammulated owl (*Otus flammeolus)* | SC | none | | X | None |
| Golden eagle (*Aquila chrysaetos)* | SC | none | X | X | None |
| Lewis' woodpecker (*Melanerpes lewis)* | SC | none | | X | None |
| Marbled murrelet (*Brachyramphus marmoratus)* | ST | FT | X | X | NLAA |
| Northern goshawk (*Accipiter gentilis)* | SC | Fco | X | X | Neg-Minor Adverse |
| Northern spotted owl (*Strix occidentalis caurina)* | SE | FT | X | X | NLAA |

| Species<br>Common Name (*Scientific Name*) | Species Status | | Park | | Effect |
|---|---|---|---|---|---|
| | State | Federal | MORA | NOCA | |
| Peregrine falcon (*Falco peregrinus)* | SS | FCo | X | X | None |
| Pileated woodpecker (*Dryocopus pileatus)* | SC | none | X | X | Neg-Minor Adverse |
| Sandhill crane (*Grus canadensis)* | SE | none | | X | None |
| Vaux's swift (*Chaetura vauxi)* | SC | none | X | X | None |
| Western grebe (*Aechmophorus occidentalis)* | SC | none | X | X | None |

SS: Species of Special Status
SC: State Species of Concern
ST: State Threatened Species
SE: State Endangered Species
FCo: Federal Species of Concern
FE: Federal Endangered Species
FC: Federal Candidate Species
FT: Federal Threatened Species
NLAA: Not Likely to Adversely Affect
Neg-Minor: Negligible to Minor Impacts

In compliance with the Endangered Species Act, the NPS is conducting informal consultation with the US Fish and Wildlife Service (USFWS) regarding potential impacts to federally-listed species from the preferred alternative as a part of this planning effort – a process that involved writing a Biological Assessment (BA) that includes a full affected environment section for each species and a thorough analysis of impacts along with a determination of effect to the species. When applicable, the analysis below incorporates the information in the BA by reference. The *Biological Assessment* prepared for this Plan/EA was submitted to USFWS on September 15, 2014 and is included in Appendix A.

**Fisher (Federal Candidate, State Endangered)**

The fisher is a medium-size mammalian carnivore and the sole member of the genus *Pekania* in the family Mustelidae. It has the build of a stocky weasel — a pointed face, rounded ears, a long and slender body, short legs, and a well-furred tail about one-third its total length (Lewis and Hayes 2004). Fishers have partially retractable claws that allow them to climb and move through trees and descend in a headfirst position (Powell 1993).

Fishers inhabit a variety of forest types; however, key forest habitat features that fishers require include canopy cover generally greater than 50 percent; large trees with cavities sufficiently large enough to provide denning sites; and large limbs, snags, and logs for resting sites (Lewis and Hayes 2004). Because it takes considerable time for these structures to develop in forest stands, fishers are often associated with late-successional forests. However, the amount of late-successional forest needed to support a fisher population in Washington is unknown. The fishers' association with large structures typically found in late-successional forest, the large home ranges of individuals, and their sensitivity to forest fragmentation suggest that landscapes comprised of large, contiguous patches of late-successional forest are more likely to support a fisher population than more fragmented landscapes containing patches of late-successional forest (Jones 1991). In many parts of their range, fishers use deciduous trees for denning and resting; however, deciduous trees are not required as fishers occur in areas without deciduous trees.

Fishers are solitary animals; they interact with other fishers only during the breeding season and when defending a territory (Powell 1993). Fishers exhibit intrasexual territoriality; however, male home ranges may overlap with multiple female home ranges (Powell and Zielinski 1994; Powell 1993; Weir 2003). Based on estimates from radio-telemetry studies conducted in the western North America, male fishers have an average annual home range of approximately 18.7 square miles, whereas average home range size for female fishers is smaller, at 6.9 square miles (Lofroth et al. 2010). Fishers give birth in late

March and early April and mate within ten days after giving birth. Because of the delayed implantation of the fetus (common among mustelids), fishers do not give birth until approximately one year after they mate (Powell 1993; Frost et al. 1997).

Female fishers give birth to kits in tree cavities (Paragi et al. 1996, Lofroth et al. 2010, Raley et al. 2012, Weir et al. 2013). Fisher kits are altricial (Hall 1942; Coulter 1966; Powell 1993). Their eyes and ear canals open at about seven to eight weeks, and shortly thereafter the mother begins bringing them solid food (Coulter 1966; Powell 1993). In the wild, fisher kits at three to four months of age are still learning to climb trees and handle prey that the adult female has captured. Fisher kits appear to stay within their mother's home range through their first fall and early winter before dispersing (Paragi 1990; Aubry and Raley 2006).

The primary fisher denning period (from birth to weaning) lasts about ten weeks, and researchers have found that females with kits may use more than one den site during that time (Arthur and Krohn 1991; Paragi et al. 1996; Truex et al. 1998; Aubry and Raley 2006; Higley and Matthews 2006). Adult females become more mobile but may still use cavities in various types of structures, such as live and dead trees and hollow logs, for prolonged periods of time when their kits become more mobile (Truex et al. 1998; Aubry and Raley 2006; Higley and Matthews 2006; Weir 2007).

Fishers use rest sites between periods of activity. Rest sites are generally used for only a single resting or sleeping bouts; however, the same site may be used for many days when weather is severe or a large food item has been cached nearby. Rest structures used by west coast fishers include mistletoe and rust brooms, large lateral limbs and limb clusters in the canopies of live trees, rodent or raptor nests, cavities in snags or logs, ground burrows, or beneath piles of cull logs (Powell 1993, Lofroth et al. 2010). Rest sites are often in large diameter trees that are usually the largest and tallest in the immediate area (Aubry et al. 2013).

Fishers hunt predominantly by sight and hearing, and individuals travel over a large home range in search of prey (Powell 1993, Lewis and Hayes 2004). Fishers in western North America are generalists in prey selection, and their diet varies by location as well as seasonally within a location, likely in response to prey availability (Martin 1994, Weir et al. 2005, Zielinski et al. 1999). Fishers consume a variety of small and mid-sized mammals and birds, insects, reptiles, and plant material, although they rarely eat amphibians. In the Pacific states, small and mid-sized mammals comprise more than 70 percent of their diet. These species include snowshoe hare, porcupines, squirrels (*Tamiasciurus* spp.), woodrats (*Neotoma cinerea)*, voles, mice, and mountain beavers (*Aplodontia rufa*) (Scheffer 1995, Powell and Zielinski 1994). Food habits studies infrequently report results to species for birds, however the birds that are most commonly reported are diurnally active species, such as songbirds, jays, grouse, and woodpeckers (NPS 2007b).

Although there have been no formal diet analyses conducted on fishers in Washington, Scheffer (1995) did report information gathered by trappers and early naturalists who examined fisher stomach contents or observed fisher foraging. In the Cascade Range of Washington State, fisher diets likely consisted of mountain beavers, squirrels, and snowshoe hares. Fisher scats were also observed to contain huckleberries and salal berries (Scheffer 1995). The fisher diet also consists of carrion, particularly from ungulates, in the winter and early spring months (Jones 1991).

Potential predators of fishers in the SW and NW Cascades include coyotes, bobcats, mountain lions (*Puma concolor*), other fishers, and golden eagles (*Aquila chrysaetos*) (Powell and Zielinski 1994; Gilbert and Keith 2001). Although predation on fishers is recorded as a cause of death in the east (Krohn et al.

1994; York 1996), it appears to be a lesser source of mortality in the east (Douglas and Strickland 1987) than in the west coast populations (Wengert et al. 2013, Lewis 2014c). The upper limit of life expectancy for fishers is generally believed to be about ten years of age (Powell 1993); however, a fisher in British Columbia was 12 years old when trapped (Weir 2003).

On the west coast, fishers still inhabit four areas: northern and central British Columbia, Southern Oregon Cascades, Southwestern Oregon and Northwestern California, and the Southern Sierra of California. Fishers were also recently reintroduced to the Olympic Peninsula in 2008-2010 and in the northern Sierra Nevada in 2009-2011. Throughout the west coast, fishers are associated with low to mid elevation coniferous or mixed deciduous-coniferous forests (Aubry and Raley 2006; Weir 2007; Zielinski et al. 2006). Fishers are generally confined to areas that do not have deep, soft snow that persists for extended periods of time during winter, and therefore tend to avoid some subalpine forests. In California, fishers appear to be primarily limited to areas with less than nine inches of snow per winter month (Krohn et al. 1997).

In the two parks, fishers have been considered extirpated from MORA since 1935, and were last documented via sightings/tracks in NOCA in 1989 (Lewis and Stinson 1998; Aubry and Houston 1992). Both parks receive occasional reports of fisher observations; however, none have been verified. The NPS completed a number of carnivore studies within MORA and NOCA to detect fishers and other carnivores between the 1980s and early 2000s. During the winters of 2000-2002, a parkwide survey to detect forest carnivores was completed at MORA using remote cameras (Reid et al. 2010). The methodology used was the same used to successfully detect fisher presence elsewhere (Zielinski and Kucera 1995), but despite 46 camera stations, 1,571 camera nights, and photo documentation of seven forest carnivore species, including American marten, no fishers were detected. From the summer of 1988 to the spring of 1992, park staff at NOCA conducted a vertebrate survey in the Stehekin Valley, but over the course of those four years no fishers were detected (Kuntz and Glesne 1993). Similarly, Christophersen et al. (2005) conducted a more targeted survey of forest carnivores in 2003 and 2004, using the same methodology as the MORA survey, and despite the 78 camera stations, 2,178 camera nights, and photo documentation of seven other forest carnivore species, no fishers were detected.

According to the Habitat Assessment completed as part of the *Feasibility Assessment for Reintroducing Fishers to Washington*, the Cascade Mountain Range (approximately 12.4 million acres) supports approximately 1.6 million acres of suitable fisher habitat, much of which is contiguous and not heavily dissected by state or federal highways. Lawler et al. (2012) projected that under climate change projections, the fisher will experience small climate-driven range *expansions* in the Washington Cascades. About 1.1 million acres of this suitable habitat is found on the west side of the Cascade crest and makes up about 17 percent of the western Cascades ecosystem (Lewis and Hayes 2004:22-23) (see *Table 3.4: Suitable Fisher Habitat in the Cascades*). Of the suitable habitat, the NPS owns eight percent, the USFS owns 68 percent, tribes own 2.6 percent, and the remaining habitat is owned by WDNR and private landowners (Hayes and Lewis 2006). There are additional hectares of mid-seral habitat interspersed with identified suitable habitat that fishers could use for travel and foraging (Lewis and Hayes 2004). The greatest density of suitable habitat is found on the west side of the Cascades (Lewis and Hayes 2004).

**Table 3.4: Suitable Fisher Habitat in the Cascades**

| Ecosystem | Total Suitable Habitat (approximate) | Suitable Habitat in NPS unit (approximate) |
|---|---|---|
| **South Cascades** | 773,560 acres (~313,050 ha) | 38,200 acres (~15,460 ha) in MORA |
| **North Cascades** | 821,510 acres (~332,450 ha) | 91,460 acres (~37,010 ha) in NOCA |
| **TOTAL** | 1,595,070 acres (~645,500 ha) | 129,660 acres (~52,470 ha) |
| Source: Lewis and Hayes 2004; NPS files<br>*Acreage/ha based on I-90 as the barrier between SW and NW Cascades. Acreage/ha rounded to the nearest 10th. | | |

### Canada Lynx (Federal Threatened, State Threatened) and Critical Habitat

See *Appendix A: Biological Assessment* - Restoration of Fishers to Mount Rainier National Park and North Cascades National Park Complexfor a description of the affected environment for Canada lynx and designated Critical Habitat.

### Cascade Red Fox (State Candidate)

The Cascade red fox (*Vulpes vulpes cascadensis*) is a rare, endemic subspecies of red fox found only at high elevations in the Cascade Range in Washington State. This native montane red fox is genetically, ecologically, and morphologically distinct from the non-native lowland red fox seen throughout the West (Aubry et al. 2009, Sacks et al. 2010).

MORA contains a significant portion of the known population of Cascade red foxes. At present, Cascade red foxes are known to occur primarily in MORA, the Goat Rocks Wilderness, and Mount Adams Wilderness (J. Akins, University of California, Davis, unpub. data, 2014). There have been no recent reports of Cascade red foxes in NOCA (NOCA park files), and they were not documented during a 2003-2004 parkwide survey for forest carnivores (Christophersen et al. 2005).

Recent analyses show Cascade red foxes having lower genetic diversity than other montane fox populations, possibly due to the limited population size and geographical isolation (J. Akins, University of California, Davis, unpub. data, 2014). The Cascade red fox might be further threatened by expanding coyote (*Canis latrans*) populations, which are known to supplant the smaller red fox from their range (Sargeant and Allen 1989, Gosselink et al. 2007), and potential genetic introgression by non-native lowland red foxes (Aubry 1983, Sacks et al. 2010).

Cascade red foxes can be found primarily in subalpine parklands in MORA (e.g. Paradise, Sunrise), and rarely travel below 4000 feet (1016 m) in elevation (Aubry 1983, Jenkins et al. 2013). They prey mostly on small mammals (chipmunks, squirrels, pocket gophers, snowshoe hares) and grouse (Aubry 1983, MORA park files). Den sites discovered in and adjacent to MORA were found dug under boulders or at the base of trees (Aubry 1983, MORA park files).

### Gray Wolf (Federal Endangered, State Endangered)

See *Appendix A: Biological Assessment* - Restoration of Fishers to Mount Rainier National Park and North Cascades National Park Complexfor a description of the affected environment for the gray wolf.

### Grizzly Bear (Federal Threatened, State Endangered)

See *Appendix A: Biological Assessment* - Restoration of Fishers to Mount Rainier National Park and North Cascades National Park Complexfor a description of the affected environment for the grizzly bear.

### Marbled Murrelet (Federal Threatened, State Threatened)

See *Appendix A: Biological Assessment* - Restoration of Fishers to Mount Rainier National Park and North Cascades National Park Complex for a description of the affected environment for the marbled murrelet.

### Northern Goshawk (Federal Species of Concern, State Candidate)

The northern goshawk is a large, raven-sized hawk with a long tail and short wings. It has a black crown and cheeks, a broad white stripe over the eye, a pale gray breast, and a darker gray back (USFWS 2014d). Northern goshawks are the largest species of the genus *Accipiter*. Throughout their range, northern goshawks can be found in coniferous and deciduous forests. In western Washington, nests are typically built in Douglas-fir (*Pseudotsuga menziesii*) and, to a lesser extent, western hemlock (*Tsuga heterophylla*). Goshawks build fairly large, bulky stick nests that are usually placed in the lower third of forest canopy and relatively close to the tree trunk (Finn et al. 2002). Nest sites are located in post-fledgling family areas, which are areas where adult females and developing juveniles concentrate after fledging and before dispersal. Family areas typically occur in structurally complex forests that provide foraging opportunities, as well as hiding cover for fledglings. In western Washington, family areas occur in mature forests with a dense cover of trees and an abundant number of snags and downed logs (Finn et al. 2002).

Northern goshawks forage in a variety of forest types, although limited information is available to describe foraging habitat in Washington. In general, appropriate foraging conditions include late-seral forest stands with well-developed canopies and adequate flight space beneath the canopy for goshawk hunting. Goshawks are considered opportunistic foragers, as exhibited by the wide range of prey taken (Watson et. al. 1998, Squires and Reynolds 1997). Douglas squirrels, grouse, and snowshoe hares were the prey species most frequently represented in the diet of goshawks on the Olympic Peninsula. Chipmunks, other squirrels, and birds were also components of the goshawk diet (Bloxton 2002).

### Northern Spotted Owl (Federal Threatened, State Endangered)

See *Appendix A: Biological Assessment* - Restoration of Fishers to Mount Rainier National Park and North Cascades National Park Complexfor a description of the affected environment for the northern spotted owl.

### Pileated Woodpecker (State Candidate)

Pileated woodpeckers are large woodpeckers that prefer mature deciduous or mixed forests. They occur in the northwestern U.S., parts of Canada, and the eastern U.S. (Bull and Jackson 2011). Fishers have been known to use old, unoccupied woodpecker nest sites and other pileated woodpecker excavations in trees for rest and den sites (Aubry and Raley 2006). The remains of a recently killed female pileated woodpecker were recovered at an occupied fisher rest site, and may indicate that fishers occasionally prey on this species (J. Lewis, unpublished data).

### Western Gray Squirrel (State Threatened)

The western gray squirrel (*Sciurus griseus*) is the largest native tree squirrel occurring in Washington, Oregon, and California. Western gray squirrel populations have declined throughout the species' geographical range, but most notably in Washington where it is now confined to three disjunct areas: the Southeastern Cascades near the Columbia Gorge, the southern Puget Trough, and the North Cascades of north-central Washington in Chelan and Okanogan counties (Linders and Stinson 2007). The Chelan and Okanogan county population may be fragmented further into small sub-populations. One of these small sub-populations of squirrels is located in the Stehekin Valley, which is part of the

Lake Chelan National Recreation Area of NOCA. This population is the only one that occurs on NPS lands in the Washington Cascades. The North Cascades population represents the northern extreme of the species range. No population exists in MORA.

As local populations continued to decline, the western gray squirrel was listed as a state threatened species by the Washington Department of Fish and Wildlife (WDFW) in 1993 (WAC 232.12.011). Causes for decline include over-hunting, habitat loss and degradation, road-kill mortality, potential competition with introduced squirrels, an altered fire regime, and disease (Gregory 2005, Linders and Stinson 2007). WDFW completed a state recovery plan for western gray squirrels in 2007 (Linders and Stinson 2007) and updated its Priority Habitat and Species Management Recommendations for the species in 2010. The recovery plan identifies the North Cascades Recovery Area, which includes the Stehekin and upper Lake Chelan population located in the Lake Chelan National Recreation Area as well as the Okanogan population to the east and northeast of upper Lake Chelan (Linders and Stinson 2007).

Although the current size of the statewide population remains unknown, a recent estimate, based on data collected from 1994-2005, was between 468 and 1,405 individual squirrels (Linders and Stinson 2007). Stuart (2012) more recently reported the North Cascades population may be between 500-1,000 individuals, based on genetic analysis. This suggests the North Cascades may provide better habitat and support a somewhat larger population than previously assumed. There can also be wide fluctuations in population size from year to year due to disease and changes in food supply which may be interrelated (Cornish et al. 2001, Linders and Stinson 2007).

Throughout most of their range, western gray squirrels prefer dry, mixed oak, and conifer forests. The North Cascades region lacks the oak component present elsewhere, but contains ponderosa pine/mixed conifer habitat which is used by squirrels. Stand characteristics of quality habitat typically include large mature trees with dominant and co-dominant connecting crowns, and sparse understory shrubs, which collectively provide for seed production, nesting, predator protection, and arboreal travel (Linders and Stinson 2007). In Stehekin, western gray squirrels frequently nest in Douglas-fir and ponderosa pine trees that are >40 cm (15.8 in) dbh, with interspersed canopies, and often use dwarf mistletoe brooms located in the upper 1/3 of the canopy for nest platforms (Hamer et al. 2005, Stuart 2012).

Hypogeous fungi (truffles and false truffles), pine nuts, acorns, other seeds, green vegetation, fruit and insects are the main components of the western gray squirrel diet throughout its geographic range (Cross 1969, Steinecker and Browning 1970). Pine nuts and truffles may be the most reliable food for western gray squirrels in Stehekin. Spores of 21 fungal genera were identified from 60 fecal samples collected from western gray squirrels in Stehekin (Stuart 2012).

### Wolverine (State Candidate)

The wolverine (*Gulo gulo*) is the largest terrestrial member of the family Mustelidae, with adult males weighing 26 to 40 pounds (12 to 18 kg) and adult females weighing 17 to 26 pounds (8 to 12 kg). Wolverines resemble a small bear with a bushy tail and a contrasting longitudinal band on its side. Wolverines are opportunistic carnivores in summer and primarily scavengers in winter (Banci 1994). Large mammal carrion is central to their diet, and wolverine distribution may be directly linked to the availability of ungulate carrion (Banci 1994). Small and mid-sized mammals such as marmots and porcupines are alternate prey (Lofroth et al. 2007).

In the contiguous United States, wolverines are restricted to high-elevation subalpine and alpine areas in the West and are dependent on deep persistent snow cover for successful denning (Aubry et al. 2007,

Copeland et al. 2010). During winter, female wolverines den and give birth at high elevation sites that are associated with coarse talus, boulders, and fallen trees, and these sites are covered by at least 3.3 feet (one meter) of snow (Magoun and Copeland 1998). Rather than selecting for vegetation types, mature female wolverines seem to be behaviorally limited to denning in remote unroaded areas away from human disturbance (Krebs and Lewis 1997). Wolverines in the contiguous United States exist as small and semi-isolated subpopulations in a larger metapopulation that requires regular dispersal of wolverines between subpopulations to maintain itself.

Wolverines are considered extirpated in MORA, with the last confirmed presence reported in 1967 (Yocum 1974). Remote-camera carnivore surveys in 2001-2002 failed to detect any wolverines (Reid et al. 2010). Observations of individual wolverines have been reported in MORA on occasion, however none were verifiable (i.e., associate with a photo, carcass or DNA; MORA wildlife observation files). Wolverines are confirmed to the north (NOCA—see below, WDFW 2013c) and to the south. To the south, wolverines have been photographed in the Goat Rocks Wilderness and on Mount Adams (Jocelyn Akins, Cascades Carnivore Project, http://cascadescarnivoreproject.blogspot.com/). Thus, there is the possibility that wolverines may use MORA on occasion; however, the NPS does not currently have any indication of extensive use or presence in MORA.

A small population of wolverines inhabits the North Cascades, including NOCA lands. Seven or more GPS-collared wolverines used NOCA lands to some extent from 2007–2012 (Aubry et al. 2012). Individual wolverines ranged widely in the North Cascades of Washington and southern British Columbia; one home range was approximately as large as NOCA. One wolverine captured (but not collared) east of the park in 2012 was later confirmed by photograph and DNA west of the park; this was the westernmost documentation of a wolverine in 18 years (NOCA park files). An additional wolverine was confirmed in 2012 by photograph and DNA southwest of the park (Long et al. 2013). These westside detections may suggest an even broader range than previously confirmed by the USDA Forest Service project, whose trap sites are east of the park. Despite their confirmed low level of presence, wolverines were not photographed during remote camera surveys in NOCA by Christophersen et al. (2005), Christophersen (2006), or Long et al. (2012). However, during 2012, a successful reproductive den site was located in the park, with a second just northeast of the park, representing the first two documented wolverine reproductive dens ever located in Washington (Aubry et al. 2012).

Observed declines in wolverine populations are mostly due to overexploitation via trapping, predator control, and habitat losses due to human use and climate change (Banci 1994, Copeland et al. 2010). Where trapping occurs, it may represent the greatest source of mortality (Krebs et al. 2004, Squires et al. 2007). Considering these impacts to the wolverine, the species was listed as a federal candidate until recently. On August 12, 2014, the U.S. Fish and Wildlife Service determined that the wolverine does not warrant protection under the Endangered Species Act, and the species was downlisted from a candidate species.

### Migratory Birds

The Migratory Bird Treaty Act (16 USC 703-712) makes it unlawful to pursue, hunt, capture, or kill any non-game migratory bird, part, nest, egg, or product, manufactured or not. The USFWS allows vacant nests to be taken, but nests with active birds, young, or the presence of eggs must be left alone.

Over 170 species of birds have been observed within MORA. Over 80 percent of these species are migratory. Short-distance or altitudinal migrants include varied thrush *(Ixoreus naevius)*, dark-eyed

junco *(Junco hyemalis)*, and gray-crowned rosy finch *(Leucosticte tephrocotis)*; medium-distance migrants include white-crowned sparrow *(Zonotrichia leucophrys)* and mountain bluebird *(Sialia currucoides)*; and long-distance or neotropical migrants include waterbirds, raptors, flycatchers, swallows, thrushes, warblers, tanagers, and others. Some commonly observed long-distance migrants are red-tailed hawk *(Buteo jamaicensis)*, Pacific-slope flycatcher *(Empidonax difficilis)*, violet-green swallow *(Tachycineta thalassina)*, hermit thrush *(Catharus guttatus)*, Townsend's warbler *(Dendroica townsendi)*, and western tanager *(Piranga ludoviciana)*.

Approximately 192 bird species have been observed within NOCA. Just over half of these species breed within NOCA. Approximately 80 species (42 percent) are neotropical migrants that winter south of the U.S. border. Migratory bird species in NOCA include common merganser (*Mergus merganser*), bald eagle (*Haliaeetus leucocephalus*), rufous hummingbird (*Selasphorus rufus*), and an assortment of flycatchers (*Empidonax spp.*, *Contopus spp.*, *Sayornis saya*) thrushes (*Catharus spp.*, *Ixoreus naevius*, *Turdus migratorius*), warblers (*Dendroica spp.*, *Vermivora spp.*, *Geothlypis spp.*, *Oreothlypis spp.*, *Setophaga spp.*,*Cardellina pusilla, Oporornis tolmiei.*) and sparrows (*Spizella spp.*, *Passerculus spp.*, *Zonotrichia spp.*,*Passerella spp.*, *Melospiza spp.*). Along the Skagit River, deciduous forests and willows support small breeding populations of several bird species that are rare elsewhere in western Washington, such as the veery (*Catharus fuscescens*), Nashville warbler (*Vermivora ruficapilla*), American redstart (*Setophaga ruticilla*), and lazuli bunting (*Passerina amoena)* (Wahl 1995, Smith et al. 1997).

## Impacts from the Alternatives

Potential impacts on special status species or their habitat were evaluated based on species presence in the area of analysis, a species' historical association with fishers, and the effects on competition for resources caused by the reintroduction of fishers within suitable fisher habitat in MORA and NOCA that could become inhabited by fishers.

Animal species at MORA and NOCA that have the potential to be affected by the management alternatives include the fisher (federal candidate and state endangered), Canada lynx (federal and state threatened), Cascade red fox (state candidate), gray wolf (federal and state endangered), grizzly bear (federal threatened and state endangered), marbled murrelet (federal and state threatened), northern goshawk (state candidate), northern spotted owl (federal threatened and state endangered), pileated woodpecker (state candidate), western gray squirrel (state threatened), and wolverine (state candidate). Migratory birds also have the potential to be affected by the alternatives in this Plan/EA.

### Alternative A - No Action Alternative

#### *Direct and Indirect Impacts*

Because no fisher reintroduction would occur in the NW Cascades under Alternative A, this state endangered species would continue to be extirpated from a significant portion of its historical range. As a result, the species' overall resiliency in Washington State, in comparison to Alternative B, would be more vulnerable to catastrophic or stochastic events such as catastrophic wildfires, volcanic eruptions, forest disease outbreaks, fisher disease outbreaks, or the genetic and demographic effects of small, isolated populations. The goals of the *Washington State Recovery Plan for the Fisher* would also not be met and the species would remain listed as state endangered. In addition, essential predator-prey interactions and a more fully functioning ecosystem would not be restored within NOCA and the surrounding NW Cascades, and wildlife communities would continue to be adversely impacted by the absence of a native predator in this region. However, because Alternative A would not result in any

action in the NW Cascades, there would be no additional impact to threatened, endangered, or sensitive wildlife species in the NW Cascades under Alternative A beyond these current conditions, and there would be no impact to the Canada lynx, gray wolf, grizzly bear, western gray squirrel, and wolverine beyond current conditions, as these species are not present in and/or considered extirpated from MORA.

While fishers would not be reintroduced directly into MORA under Alternative A, WDFW would likely reintroduce fishers into the surrounding SW Cascades which would be expected to immigrate into MORA over time. A successful fisher restoration in the SW Cascades and MORA would therefore have a moderate beneficial impact on the West Coast DPS fisher population as a whole, because reintroduction would result in improvements to population size and long-term viability of the species which would be readily apparent but limited in extent. Because dispersal rates into MORA would likely be slower under this Alternative in comparison to Alternative B, Alternative A would have delayed but similar impacts on other species of special status as Alternative B. Therefore, impacts from Alternative A to marbled murrelet and northern spotted owl would be none to negligible, adverse, and long-term in MORA. Impacts to other special status species in MORA would be adverse and long-term, ranging from negligible to minor. See impacts to Alternative B below for more discussion.

#### *Cumulative Impacts*

Past, present, and reasonably foreseeable future activities occurring within and around MORA and NOCA have affected and would continue to affect species of special concern. The presence of NPS staff and visitors and the construction, maintenance, and use of roads, trails, utility lines, buildings, and other development would likely disturb wildlife species through noise and human presence, and fire management activities would temporarily displace some animals. These activities would continue to have adverse, negligible to minor, cumulative impacts on species of special concern in MORA and NOCA. Impacts from these ongoing activities on species of special status in MORA would not be exacerbated by activities associated with the reintroduction of the fisher in the SW Cascades under Alternative A as reintroduction activities would not be noticeably distinct from other current uses and activities.

Several ongoing projects and plans would also have a beneficial impact on wildlife species of special concern. The 1997 multispecies habitat conservation plan (WDNR 1997) would continue to manage forest activities and habitats on state trust lands while protecting the habitat of several threatened and endangered species. Multiple forest thinning projects planned in surrounding national forests in accordance with the Northwest Forest Plan (USDA and USDI 1994) would also thin second-growth forest and young managed stands. These projects would enhance species diversity and structural diversity of forest stands and thus, improve wildlife habitat, which would have a beneficial impact on many wildlife species, including the fisher, Canada lynx, and wolverine, among others. Ongoing invasive plant management in the surrounding USFS lands could also promote wildlife habitat, resulting in a beneficial impact. These projects would have a cumulative, minor, beneficial impact on species of special concern, as sufficient habitat would be available to maintain viability of native species.

#### *Conclusion*

Alternative A would have no adverse impacts on species of special concern in NOCA because fishers would not be reintroduced to the area and there would be no change to current conditions. However, fishers would remain extirpated from a significant portion of their historical range, and the negative impacts of this extirpation on local ecosystems would continue in perpetuity. The species would not be fully restored in the State of Washington and would not be considered for downlisting by the

State. Cumulative impacts on species of special concern from ongoing NPS activities in the area would be a negligible to minor adverse impact. There would be minor, beneficial cumulative impacts from existing conservation and habitat restoration plans for the park and surrounding federal lands.

Alternative A would have similar impacts as Alternative B to species of special concern in MORA, albeit delayed due to the anticipated slower recovery of fisher in the park. There would be a moderate beneficial impact on the West Coast DPS fisher population as a whole, but other species of special status would experience negligible to minor adverse impacts from fisher reintroduction. Cumulative impacts to species of special concern in MORA would be the similar as those in NOCA.

### Alternative B – Reintroduce Fishers into MORA and NOCA Using Translocation

#### *Direct and Indirect Impacts*

Under Alternative B, approximately 160 fishers would be translocated to the SW and NW Cascades reintroduction areas, including MORA and NOCA, over a four to six year period. Actions involved would include (1) live-trapping fishers from a source population[4] and transporting them to the parks and surrounding federal lands; (2) releasing them from roads or accessible trails; and (3) monitoring movements, survival, home range establishment, and reproduction. Transporting fishers to the parks would not measurably affect other wildlife beyond that which is discussed under *Wildlife* later in this chapter.

**Fishers**

The implementation of specific handling procedures and the utilization of a trapping coordinator, captive wildlife specialists, and veterinarians as described in chapter 2 would minimize adverse impacts of capture and the translocation process on individual fishers, and as fishers from British Columbia would come from similar coniferous forest habitats as found in the SW and NW Cascades, they are expected to easily adapt to the forest structure and diverse prey base that exists throughout the Cascades. Similarly, the adaptive management protocols identified in chapter 2 could increase the likelihood of home range establishment and reduce risk of mortality, further minimizing any adverse impacts to fishers from translocation.

Reintroductions and monitoring efforts could potentially impact previously released fishers. The use of vehicles on park roads during fisher releases and follow-up radio telemetry on foot in remote areas of the parks may temporarily disturb individual fishers in the immediate area. Fisher response to this type of disturbance could range from slight behavior changes for the duration of the disturbance, such as hiding or temporary displacement. However, if fishers were released during the preferred timeframe in the late fall/early winter, as planned, there would be no impacts to breeding fishers, as fishers breed from March to May and typically give birth the following March to April. Furthermore, impacts to previously released fishers from aerial telemetry flights are not expected to significantly disturb fishers. If an individual was disturbed, the temporary and intermittent nature of monitoring activities (e.g., fixed wing overflight) would allow disturbed individuals to quickly return to their normal behavior. Because these impacts would be temporary, difficult to measure (or measurable but not outside the natural range of variability), and would not extend past three years of each reintroduction effort, these impacts, though direct and adverse, would be short-term and negligible.

[4] Impacts from this action have been dismissed from further analysis. See *Impact Topics Dismissed from Detailed Analysis* in chapter 1 for more information.

Sources of mortality of released fishers are likely to include fisher-vehicle collisions and predation, and may include incidental capture, poaching, or drowning. The time of year that fishers would be released could influence survival rates. Females released in late winter would have limited time to establish a home range before the breeding season. Those females that did not establish a home range prior to the breeding season would likely search for males during the breeding season and would be at greater risk of mortality (Lewis 2014c).

Assuming that self-sustaining populations of fishers were restored to MORA and NOCA under Alternative B, there would be long-term, moderate, beneficial effects on the fisher population by increasing the size and expanding the geographic range of this species into the Cascade ecosystem. Reestablishment of fishers in Washington would contribute to meeting state recovery goals and could result in the removal of fishers from the list of federal candidate species and downlisting the species from its endangered status in Washington.

While a fisher reintroduction would result in a change in the current ecosystem (e.g., increase in the local diversity and abundance of carnivores), it is expected that the reestablishment of a native species would be beneficial because it would help restore ecosystem functions in the SW and NW Cascades, including restoring predator/prey communities in forested landscapes in the parks.

**Impacts on Federally-listed Wildlife**

*Canada lynx*

As discussed in the *Biological Assessment* written for the USFWS (see Appendix A), the effects of Alternative B would have a negligible, if any, adverse long-term effect on (may affect but not likely to adversely affect) Canada lynx and designated Canada lynx habitat for the following reasons:

- Lynx have not been documented in MORA since at least 2000 and have been only rarely documented in NOCA.
- Fisher and lynx (including lynx critical habitat) occur in spatially distinct habitats. Lynx critical habitat has been designated east of the Cascades crest and most verified lynx observations in NOCA are also east of the crest; in comparison, most of the suitable fisher habitat has been identified west of the Cascade crest. Fisher release areas in NOCA have also been selected at sites west of the Cascade crest. Therefore, all reintroduction efforts would occur outside of prime lynx habitat.
- Aerial telemetry flights would be high enough to minimize any disturbance to lynx if present.
- Fisher and lynx utilize different foraging strategies and habitats which reduce competition for prey between these species, although both fishers and lynx prey on snowshoe hares and red squirrels. For example, lynx are adapted to travel in deep soft snow conditions, which fisher tend to avoid. In the Cascades, lynx use the subalpine and high elevation mixed-conifer zones above 4000 ft (1220m) (Stinson 2001), whereas fishers are associated with low to mid elevation coniferous or mixed deciduous-coniferous forests (Aubry and Raley 2006, Zielinski et al. 2006, Weir 2007).
- The rarity of both species in the Cascades, along with the above factors, reduces the chance of any interactions between the species and the possibility of fishers predating on lynx. Although significant fisher predation has not been observed among western lynx populations, it has been documented in Maine (Interagency Lynx Biology Team 2013; Vashon et al. 2012).

*Gray Wolf*
As discussed in the *Biological Assessment* written for the USFWS (see Appendix A), the effects of Alternative B would have a negligible, if any, long-term adverse effect on (may affect but not likely to adversely affect) gray wolves for the following reasons:

- Gray wolves are currently rare or non-existent west of the Cascades crest where fishers would be reintroduced and would likely populate.
- Denning and rendezvous periods for gray wolves (March 15 to July 1) do not overlap with fisher release periods (November-February) and there are no known wolves, dens, or rendezvous sites present in the fisher release areas in either MORA or NOCA.
- Aerial telemetry flights would be high enough to minimize any disturbance to wolves, if present.
- Competition for prey is possible but discountable, as wolves prey mostly on ungulates, and small mammals, such as those the fisher eat, are usually of low importance (Wiles et al. 2011).
- It is possible wolves could prey on fishers, but given the low density of each species and limited co-occurrence, encounters should be rare.

*Grizzly Bear*
As discussed in the *Biological Assessment* written for the USFWS (see Appendix A), the effects of Alternative B would have a negligible, if any, long-term adverse effect on (may affect but not likely to adversely affect) grizzly bears for the following reasons:

- Grizzly bears are extremely rare in NOCA and not present in MORA.
- Based on known denning periods of black bears and documented distances of grizzly dens from human activity (0.6-1.9 miles away), fisher release activities would not occur when grizzlies would be active and would not occur near grizzly dens.
- Given the rarity of grizzly bears in NOCA, it is extremely unlikely that grizzly bears would be encountered, and ground based monitoring efforts for fishers would be limited.
- Aerial telemetry flights would be high enough to minimize any disturbance to grizzly bears, if present.
- While there would likely be overlap in habitat use between grizzly bears and fishers, such as occurs now with pine marten and other mustelids, the establishment of a self-sustaining population of fishers is not expected to adversely impact grizzly bears because (a) it is expected that these species would co-exist as they did prior to fisher extirpation; (b) extensive suitable habitat exists for both fishers and grizzly bears throughout NOCA (i.e. habitat is not limiting); (c) both species would occur in very low densities, further limiting the likelihood of interactions; (d) based on research in similar ecosystems, we assume grizzly bears likely rely primarily on vegetation within NOCA, mostly in subalpine meadows and avalanche chutes (Serrouya et al. 2011, Munro et al. 2006, Waller and Mace 1997, Mace and Jonkel 1986) where fisher are unlikely to occur; and (e) grizzly bears' reliance on small mammals for sustenance is low.

*Marbled Murrelet*
As discussed in the *Biological Assessment* written for the USFWS (see Appendix A), the effects of Alternative B would have negligible, short- to long-term adverse effects on (may affect but not likely to adversely affect) marbled murrelets for the following reasons:

- Fisher releases are not expected to take place during murrelet nesting season (April 1 – September 23).

- The level of monitoring traffic would not be above background use of the areas, and murrelets that inhabit areas near roads and trails have probably adapted to existing levels of noise and human presence associated with roads and trails.
- Aerial telemetry flights would be at an elevation that is greater than the threshold distance that could adversely affect murrelets through disturbance.
- Fishers and marbled murrelets coexisted in the Cascades for millennia prior to the extirpation of the fisher.
- Even though both species use large limbs for nesting (marbled murrelet) and rest sites (fisher), extensive suitable habitat and habitat structures for both species exist throughout the parks, both species exist at low densities, and interactions between these two species are not expected to occur.
- Although fishers prey on birds (not their primary diet), fisher predation on marbled murrelets is expected to be extremely unlikely to occur for reasons mentioned above (i.e. extensive habitat, low density, etc.) Furthermore, fishers and murrelets co-exist in portions of northwest California and, despite extensive studies, there is no documentation of fishers preying on murrelets.
- Although fledgling murrelets could become vulnerable to fishers if they became grounded, the fledging strategy for murrelets is for the chick to fly directly from the limb to the sea; grounded nestlings are either sick or fell out of the tree prematurely and are not expected to survive in the wild.

*Northern Spotted Owl*

As discussed in the *Biological Assessment* written for the USFWS (see Appendix A), the effects of Alternative B would have negligible, short- to long-term adverse effects on (may affect but not likely to adversely affect) the northern spotted owl for the following reasons:

- The actual release of fishers in the park would not take place during northern spotted owl nesting season from March 1 to September 15 (March 15 to September 30 in MORA).
- The use of vehicles on park roads and foot access on trails during monitoring efforts would not likely disturb spotted owls that inhabit the surrounding areas. The level of monitoring traffic would not be above background use of the areas, and spotted owls that inhabit areas near roads and trails have probably adapted to some levels of noise and human presence associated with the roads.
- Aerial telemetry flights would be at an elevation that is greater than the threshold distance that could adversely affect spotted owls through disturbance.
- Fishers and northern spotted owls coexisted in the Cascades for millennia prior to the extirpation of the fisher.
- Although there is a potential for fishers and spotted owls to interact, the extensive suitable habitat for both species exist throughout the parks and the low densities at which these species occur make any interaction unlikely.
- Although fishers and spotted owls both prey on some of the same species, competition is not likely to reduce the prey base for either species as the parks support a diverse and presumably adequate prey base for both species. Furthermore, spotted owls are prey specialists, focusing on arboreal small-mammals that area active nocturnally, whereas fishers are prey generalists. It is expected that the diversity of small mammals in the Cascades and the flexibility in the fishers' diet would limit their effects on the prey base for northern spotted owls (Lewis and Hayes 2004).
- The chance of a fisher preying on a northern spotted owl overall is extremely unlikely; both species are expected to occur in the parks at low densities and the chance of their encountering each other is extremely low. Furthermore, there is no documentation of a fisher preying on a spotted owl

despite extensive research on both species in areas where they co-occur at high densities in Northwestern California. Fisher rest sites tend to be only 40 to 50 feet up in trees, whereas spotted owls tend to nest higher up in tree canopies (greater than 100 feet), further decreasing a chance for an encounter or predation.

**Impacts on Other Species of Special Concern**

*Cascade red fox*
As Cascade red foxes are not currently known to occur in NOCA, the reintroduction of fishers into NOCA would not affect Cascade red foxes.

At MORA, fishers would be released at low elevations (potential release sites are below 2800 feet (848m)), below the typical elevations used by Cascade red foxes (4000 feet (1212m)) (Jenkins et al. 2013). The transportation and release of fishers would occur on or near existing roadways, and these activities would not be expected to have an effect on the Cascade red fox.

Similarly, the use of vehicles on park roads and foot access on trails during monitoring efforts would not likely disturb Cascade red foxes that inhabit the surrounding areas as the level of monitoring traffic would not be above background use of the areas and Cascade red foxes that inhabit areas near roads and trails are highly adaptable and even show highly habituated behavior in areas with high human-use (Jenkins et al. 2013). All fixed-wing telemetry flights associated with monitoring would be flown at elevations that are unlikely to disturb foxes.

Monitoring of released fishers in OLYM has shown that they use forested lands below 4700 feet (1424m) (Happe, pers. comm., 2014a). If similar elevations are utilized by fishers in MORA, fisher habitat would overlap with habitat used by Cascade red fox, increasing the likelihood for the two species to interact. Because the habitat in the park is largely intact, it is expected that these two species would co-exist as they did prior to the extirpation of the fisher. Although possible, there is no documentation of one species preying on the other. Red foxes have not been identified in the diet of fishers, and very limited information on the diet of Cascade red foxes exists (e.g. Aubry 1983). While there is likely to be a dietary overlap between the two species, this overlap is not likely to reduce the prey base for either species due to their low densities. The diversity of small mammals and birds in the Cascades, the flexibility in both the fishers' and Cascade red foxes' diet, and the limited overlap in altitudinal range (approximately 700 feet (212 m)) would limit their competition with Cascade red foxes.

Considering the above factors, no impacts to the Cascade red fox are anticipated from actions associated with reintroduction efforts, but it is possible that this species could experience short- to long-term adverse impacts from the restoration of the fisher in the Cascades. The intensity of these impacts would likely range from negligible to minor as most impacts are expected to be measurable, but within the normal range of variability, but some impacts could result in the fatality of individual animals if they fall prey to fishers.

*Northern Goshawk*
As with marbled murrelets and northern spotted owls, trapping and transporting fishers from the source population to MORA and NOCA would not be expected to affect northern goshawks; however, the actual release of fishers in the parks could temporarily disturb individual goshawks for the duration of the release event.

Factors affecting northern goshawks during monitoring activities associated with the reintroduction of fishers to MORA and NOCA would be similar to those discussed for the marbled murrelet and northern spotted owl in the *Biological Assessment* (Appendix A). Of primary concern would be the use of fixed-wing aircraft during the gathering of radio-telemetry information, which may disturb some goshawks. This effect would be minimized by flying over 500 feet agl or 333 feet above tree canopy, whichever is higher, as described in the mitigation measures identified in *Chapter 2: Alternatives.*

Establishing a self-sustaining fisher population could have long-term impacts on northern goshawks, as both species occur in similar forest types and exhibit some overlap in use of prey species, including ground squirrels, tree squirrels, snowshoe hares, grouse, corvids, and other birds (Squires 2000). Both goshawks and fishers have a diverse prey base and are known to switch to alternative food sources when prey availability is low; so, the effect on the prey base for northern goshawks would be limited. These factors would minimize the likelihood of competition for prey between these species (Lewis and Hayes 2004).

In Wisconsin and Michigan, fishers were found to be important predators of goshawks; however, some of these events were associated with researcher activities (Duncan and Kirk 1995, Bowerman et al. 1999, Erdman et al. 1998, as cited in Roberson et al. 2003). No information was found for fisher predation on goshawks in the west, probably due to the very low numbers, or extirpated populations, of fishers there. Thus, there is a possibility that fishers may prey on goshawks. However, given that extensive suitable habitat for both species occurs in both parks, the fact that these species both occur at very low densities, and the fact that fishers and northern goshawks once coexisted in similar habitats, it is expected that the two species would continue to coexist following fisher restoration.

Considering the above factors, it is unlikely that northern goshawks would be adversely impacted by actions associated with reintroduction efforts, but if impacts would occur, they would be short-term and negligible as they would likely be within the normal range of variability. It is also possible that this species could experience short- to long-term adverse impacts from the restoration of the fisher in the Cascades given that northern goshawks have been documented as prey for fisher in the past. The intensity of these impacts would likely range from negligible to minor as most impacts are expected to be measurable, but within the normal range of variability, but some impacts could result in the fatality of individual animals if they fall prey to fishers.

*Pileated Woodpecker*

As with the other species discussed previously, trapping and transporting fishers from the source population to MORA and NOCA would not be expected to affect pileated woodpeckers. Establishing a self-sustaining fisher population could have long-term impacts on pileated woodpeckers, as both species occur in similar forest types. Cavities created by pileated woodpeckers in hollow trees and snags are frequently used by fishers for den and rest sites. The remains of a female pileated woodpecker were found at a fisher rest site in the southern Oregon Cascades, indicating that fishers may occasionally prey on pileated woodpeckers (Lewis, unpublished data). Because adverse impacts to pileated woodpeckers and their habitat would not be measurable, or measurable but not outside the natural range of variability, and impacts would not affect nesting periods or habitat, overall adverse impacts would be short- to long-term and negligible to minor.

*Western Gray Squirrels*

As fisher releases would occur west of the Cascade crest, release activities would have no effect on western gray squirrels, which occur only east of the Cascade crest. If released fishers expand east of the Cascade crest, the use of vehicles on park roads and foot access during monitoring efforts would not likely disturb western gray squirrels that inhabit the surrounding areas. Vehicle traffic associated with monitoring efforts would not be above background levels, and western gray squirrels that inhabit areas near roads and trails have probably adapted to some levels of noise and human presence associated with the roads and trails. Aerial radio-telemetry flights would be flown at elevations at least 500 feet agl or 333 feet above tree canopy, whichever is higher, which is not expected to impact gray squirrels.

Although fishers would be released at west-side locations, far from the western gray squirrel population in the Stehekin Valley, it is unknown how far they might travel or where they may establish home ranges. During the fisher reintroduction at OLYM, fishers gradually moved away from the release sites. Some animals eventually made significant movements across rivers, over high-elevation ridges, and through the mountainous interior of Olympic National Park (Lewis and Happe 2008). Maximum distances traveled from release sites ranged from 14 to 67 miles for males and from 10 to 44 miles for females. Using this information, it is conceivable that fishers released in NOCA could travel over multiple mountain passes and into the Stehekin Valley where western gray squirrels occur. The distance from the closest release site to the nearest western gray squirrel activity area in the lower Stehekin Valley is approximately 40 miles, well within the range of post-release movement distances observed for fishers. While 40 miles is not exceptionally far for a fisher to move, their movements may be influenced by high elevation ridges, alpine landscapes, and other unsuitable habitats that may act as potential barriers or impediments to fisher movement. In north-central Idaho and west –central Montana, Jones and Garton (1994) reported fishers avoiding drier forest stands (ponderosa pine, Douglas-fir), which are representative of stands present in the Stehekin Valley. In northwestern Montana, fishers were reported as avoiding subalpine stands (Heinemeyer 1993), which fishers would also encounter in order to move into the Stehekin Valley.

Prior to releasing fishers, a basic assumption was made that the diversity and abundance of prey in the Cascades would be sufficient to support a reintroduced population (Lewis and Hayes 2004). If fishers are successful in moving into the Stehekin Valley where western gray squirrels occur, potential effects on western gray squirrels include predation by fishers. In northern California, *Sciuridae* – including western gray squirrel – were the most frequent food items found in fisher scats (Golightly et al. 2006). Rodents (squirrels, mice, voles) made up 40-50 percent of the prey identified in fisher scats for three studies of fisher food habits in the species west coast range (Aubry and Raley 2006, Golightly et al. 2006, and Zielinski et al. 1999); so, fishers may prey on available squirrel species, including western gray squirrels, where overlap of the two species occurs. However, food habits of fishers are known to differ by region, suggesting prey selection may be different in the North Cascades in spite of potential fisher and western gray squirrel overlap. Major mammalian predators of western gray squirrels in south-central Washington include bobcats and coyotes (Vander Haegen et al. 2013). Given the greater suitability of forest habitats and landscapes for fishers on the west-side of the Cascades, the exclusive east-side distribution of western gray squirrels, and the low density of both species, the release of fishers is expected to have a negligible to minor adverse, short- to long-term impact on western gray squirrels as most impacts, if they occur, would be within the natural range of variability but could involve western gray squirrel mortalities if individual squirrels fall prey to fishers.

*Wolverine*
The effects of Alternative B would have a negligible, if any, long-term adverse effect on wolverines as wolverines and fishers occur at low densities in NOCA (they are considered extirpated in MORA), and there is little overlap between fisher habitat (low and mid-elevation forests) and wolverine habitat (subalpine forests and alpine areas); consequently there is limited opportunity for interactions between individuals of these species. Fisher release sites would also be in front country locations at lower elevations and do not include the subalpine or alpine habitat primarily used by wolverines, and dens or rendezvous sites for wolverines, which occur at low densities, are located in remote, high- elevation sites; so the chance encounter of disturbing such a site when retrieving a fisher carcass or locating a fisher den on foot, would be extremely unlikely. Aerial telemetry flights would also occur primarily over low and mid-elevation forests (e.g., highest quality fisher habitat), and would be limited over higher elevation areas of potential wolverine habitat. Although both species are scavengers (Banci 1994, Powell and Zielinski 1994), wolverines, with their superior size, would be dominant over a carcass; so, competition would be limited between these two species because of limited overlap in diets and in landscapes occupied. Although fishers could be a vector for disease transmission or a vector of parasites to wolverines, no information is currently available on this or on the potential effects of disease on wild wolverine populations (USFWS 2013b). Mitigations have also been put in place under Alternative B to reduce the chance of disease or parasite transmission.

**Other Species of Special Concern**
The remainder of the species in Table 3.3 would not be affected by fisher restoration in MORA and NOCA because (1) they inhabit different habitat than fisher, (2) they have different food requirements, or (3) fishers either do not prey on these species, or prey on them only extremely rarely; therefore, they are not discussed further in this section.

*Migratory Birds*
Birds represent an important but small part of the fisher diet (Powell and Zielinski 1994). Food habits studies infrequently report results to species for birds; however, the birds that are reported are almost exclusively diurnally-active species (e.g., passerines, jays, grouse, and woodpeckers) and are thought to be caught most often while on the ground (Powell 1993), or scavenged (Raine 1987). Powell (1993) for example, believed that jays were consumed while foraging on carrion that fishers were also feeding on.

While fishers may prey on individual birds, fisher predation on migratory birds would have an overall negligible adverse long-term impact on migratory bird populations as a whole. Furthermore, the fisher and its prey, including migratory birds, coexisted prior to the extirpation of the fisher from Washington. While fisher restoration would result in a change in the ecosystem and its function, it is expected that the reestablishment of the fisher would be beneficial to the overall ecosystem function.

***Cumulative Impacts***
Cumulative impacts on wildlife species of special concern associated with Alternative B would be the same as those associated with Alternative A. Adverse impacts would be negligible to minor due to ongoing maintenance and logging activities in the area, while beneficial impacts would be minor from existing conservation and habitat restoration plans for the parks and surrounding federal lands.

***Conclusion***
**Fisher:** Because adverse impacts to individual fishers and their habitat would be too small to measure or would be measurable but not outside the natural range of variability, overall adverse impacts to this species would be short-term and negligible. However, there would be moderate and long-term

beneficial impacts on the West Coast DPS fisher population as a whole because reintroduction would increase the number of fisher populations within the species' historical range and would improve, to the maximum extent possible, the species' resiliency to catastrophic or stochastic events such as catastrophic wildfires, volcanic eruptions, forest disease outbreaks, fisher disease outbreaks, or the genetic and demographic effects of small, isolated populations. Reestablishment of fishers in Washington would also contribute to meeting state recovery goals and could result in downlisting the species' status in the State and potentially the removal of fishers from the list of federal candidate species.

**Canada Lynx:** Although impacts to Canada lynx and critical lynx habitat would be adverse, negligible, and long-term, these impacts would be unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect Canada lynx and designated Critical Habitat.

**Cascade Red Fox:** Since adverse impacts associated with Alternative B to Cascade red foxes and their habitat would be too small to measure or measurable but not outside the natural range of variability, overall adverse impacts would be short- to long-term and negligible to minor.

**Gray Wolf:** Although impacts to gray wolves would be adverse, negligible, and long-term, these impacts would be unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect gray wolves.

**Grizzly Bear:** Although impacts to grizzly bears would be adverse, negligible, and long-term, these impacts would be unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect grizzly bears.

**Marbled Murrelet:** Although impacts to marbled murrelets would be adverse, negligible, and short- to long-term, they are unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect marbled murrelets.

**Northern Goshawk:** Since adverse impacts associated with Alternative B to northern goshawks and their habitat would not be measurable or measurable but not outside the natural range of variability, and impacts would not affect nesting periods or habitat (where they may be most vulnerable), overall adverse impacts would be short- to long-term and negligible to minor.

**North Spotted Owl:** Although impacts to the northern spotted owl would be adverse, negligible, and short- to long-term, they are unlikely to occur. Therefore, this alternative may affect but would not likely adversely affect northern spotted owls.

**Pileated Woodpecker:** Since adverse impacts associated with Alternative B to pileated woodpeckers and their habitat would be too small to measure or would be measurable but not outside the natural range of variability, and impacts would not affect nesting periods or habitat, overall adverse impacts would be short- to long-term and negligible to minor.

**Western Gray Squirrel:** Since adverse impacts to the western gray squirrel and their habitat would be too small to measure or measurable but not outside the natural range of variability, overall adverse impacts would be short- to long-term and negligible to minor.

**Wolverine:** Although impacts to the wolverine would be adverse, negligible, and long-term, they are unlikely to occur.

**Migratory Birds:** While fishers may prey on individual birds, fisher predation on migratory birds would have an overall negligible adverse long-term impact on migratory bird populations as a whole.

## WILDLIFE AND WILDLIFE HABITAT

### Issues and Concerns

As the extirpation of the fisher from its historical range is believed to have disrupted the structure and function of forest ecosystems in Washington State, the proposed action would help to at least partially restore functioning ecological processes, such as interspecies competition, within the forest ecosystems of the Washington Cascades. However, fishers use similar forest types and prey on some of the same species as other mid-sized carnivores in MORA and NOCA, such as the American marten, bobcat, coyote, and Cascade red fox. Thus, there is potential for fishers to affect these species through competition for forest cover and prey.

### Affected Environment

An estimated 170 avian, 60 mammalian, 14 amphibian, 14 freshwater fish species, and five reptilian species inhabit MORA, and an estimated 192 avian, 65 mammalian, 12 amphibian, 27 freshwater fish species, and seven reptilian species inhabit NOCA. These species occupy habitats ranging from riparian to alpine. A key wildlife resource in both MORA and NOCA is the assemblage of species that depend on old-growth coniferous forest for all or some of their habitat requirements. These forests were also historically occupied by fishers in the SW and NW Cascades. This section focuses on those birds, mammals, and reptiles that occur in these habitats and may be affected by fisher restoration at MORA and NOCA. A description of the fisher itself was provided in *Species of Special Concern* earlier in this chapter. Amphibians, fish, and fish habitat are not discussed because impacts from fisher restoration are not anticipated to affect those species.

#### Mammals

Sixty species of mammals are known to occur in MORA. Another four occurred historically, but have not been documented recently, including gray wolves, fishers, wolverine, and Canada lynx. Small mammals include the deer mouse, dusky shrew, Townsend's chipmunk, Douglas squirrel, flying squirrel, hoary marmot, pika and snowshoe hare. Small and medium-sized carnivores include the long-tailed weasel, pine marten, raccoon, striped and spotted skunks, river otter, bobcat, Cascade red fox, and coyote. Large mammals include the black bear, black-tailed deer, elk, mountain goat, and mountain lion. In addition, a number of bats occur in the park, including the state and federally sensitive Townsend's big-eared bat.

Sixty-five mammal species have been documented in NOCA. Common mammal species include pika, Townsend's chipmunk, hoary marmot, Douglas squirrel, beaver, black bear, mule deer, and black-tailed deer. More elusive mammals found in the park complex include snowshoe hare, northern flying squirrel, American marten, short-tailed weasel (ermine), spotted skunk, river otter, wolverine, mountain lion, bobcat, lynx, coyote, gray wolves, elk, and the occasional grizzly bear. Nine species of bats are known to occur within NOCA boundaries. NOCA has several small bands of mountain goats, ranging from one to ten animals per band, scattered throughout the park complex with an estimated overall population of 200-300 animals (NOCA files).

#### Birds

There are over 170 species of birds that have been observed in MORA, with approximately 80 of these known to nest in the park (NPS n.d.b.). Raptors include the northern goshawk, Cooper's hawk, red-tailed hawk, sharp-shinned hawk, peregrine falcon, merlin, bald eagle, golden eagle, northern spotted owl, northern saw whet owl, barred owl, great horned owl, western screech owl, etc. Other bird species include the gray jay, varied thrush, red-breasted sapsucker, common flicker, pileated woodpecker,

Steller's jay, Oregon junco, hermit thrush, gray-crowned rosy finch, and white-tailed ptarmigan, among others.

One hundred ninety-two bird species have been observed within NOCA. Just over half of these species live year-round in NOCA and/or come to habitats within NOCA to breed and raise offspring. Approximately 80 species (42 percent) are neotropical migrants that winter south of the U.S. border. Birds that are common in NOCA include common merganser, bald eagle, rufous hummingbird, Steller's jay, American dipper, and an assortment of flycatchers, thrushes, warblers, and sparrows. Up to eight pairs of osprey nest along the Skagit River and three reservoirs: Gorge, Diablo, and Ross. Along the Skagit River, deciduous forests support small breeding populations of several bird species that are rare elsewhere in western Washington, such as the veery, Nashville warbler, American redstart, and lazuli bunting (Wahl 1995; Smith et al. 1997).

### Reptiles

Reptiles found in MORA include the northwestern garter snake (*Thamnophis ordinoides*), common garter snake (*Thamnophis sirtalis*), western terrestrial garter snake (*Thamnophis elegans*), rubber boa (*Charina bottae*), and northern alligator lizard *(Elgaria coerulea*). Reptiles found in NOCA include northern alligator lizard, rubber boa, western yellowbelly racer (*Coluber constrictor*), western terrestrial garter snake, common garter snake, western fence lizard (*Sceloporus occidentalis*), and western rattlesnake (*Crotalus viridis*).

## Impacts of the Alternatives

Potential impacts to wildlife and wildlife habitat focuses on specific wildlife species and/or their habitats within suitable fisher habitat in MORA, NOCA, and surrounding lands that could become inhabited by fishers and that could potentially be impacted by the actions described in the proposed alternatives. Animal species at MORA and NOCA that have the potential to be affected by the management alternatives include American marten, snowshoe hares, mountain beavers, small mammals (mice, voles, and shrews), porcupines, squirrels, woodrats, birds (esp. grouse), reptiles, and insects, all of which are potential prey for fishers. Fisher predators, including coyote, bobcat, and mountain lion, would also be affected by the restoration of fishers.

### Alternative A - No Action Alternative

#### *Direct and Indirect Impacts*

Because no fisher reintroduction would occur in the NW Cascades under Alternative A, essential predator-prey interactions and a more fully functioning ecosystem would not be restored within NOCA and the surrounding NW Cascades, and wildlife communities would continue to be adversely impacted by the absence of a native predator in this region. However, because Alternative A would not result in any action in the NW Cascades, there would be no additional impact to wildlife and wildlife habitat in NOCA beyond current conditions.

While fishers would not be reintroduced directly into MORA under Alternative A, WDFW would likely reintroduce fishers into the surrounding SW Cascades which would be expected to immigrate into MORA over time. Because dispersal rates into MORA would likely be slower under this Alternative in comparison to Alternative B, Alternative A would have delayed but similar impacts on wildlife and wildlife habitat as Alternative B. Therefore, adverse impacts from Alternative A to wildlife and wildlife habitat in MORA would be long-term and minor, and beneficial impacts would be long-term, and negligible to minor. See impacts to Alternative B below for more discussion.

### *Cumulative Impacts*

Past, present, and reasonably foreseeable future activities occurring within and around MORA and NOCA have affected, and would continue to affect, wildlife and wildlife habitat. The presence of NPS staff and visitors and the construction, maintenance, and use of roads, trails, utility lines, buildings, and other development would likely disturb wildlife species through noise and human presence. These activities, along with fire management activities, would temporarily displace some animals. These activities would continue to have adverse, negligible to minor, cumulative impacts on wildlife in MORA and NOCA. Impacts from these ongoing activities on wildlife in MORA would not be exacerbated by the reintroduction of the fisher in the SW Cascades under Alternative A as reintroduction activities would not be noticeably distinct from other current uses and activities.

Several ongoing projects and plans would also have a beneficial impact on wildlife species of special concern. The 1997 multispecies habitat conservation plan (WDNR 1997) would continue to manage forest activities on state trust lands while protecting the habitat of several threatened and endangered species which would also have a beneficial impact on other wildlife species that utilize similar habitats. Multiple forest thinning projects planned in surrounding national forests in accordance with the Northwest Forest Plan (USDA and USDI 1994) would also thin second-growth forest and young managed stands. These projects would enhance species diversity and structural diversity of forest stands and thus, improve wildlife habitat, which would have a beneficial impact on many wildlife species, including species like the fisher, Canada lynx, and wolverine, among others. Ongoing invasive plant management in the surrounding USFS lands could also promote wildlife habitat, resulting in a beneficial impact. These projects would have a cumulative, minor, beneficial impact on wildlife, as sufficient habitat would remain functional to maintain viability of all native species.

### *Conclusion*

Alternative A would have no additional impact to wildlife and wildlife habitat in NOCA beyond current conditions. However, due to WDFW actions to restore fisher to the SW Cascade, beneficial impacts from Alternative A to wildlife and wildlife habitat in MORA would be long-term and negligible to minor, and adverse impacts to wildlife would be long-term and minor.

Cumulative impacts on wildlife in both NOCA and MORA from ongoing maintenance and logging activities in the area would be negligible to minor adverse impact. There would be minor beneficial cumulative impacts from existing conservation and habitat restoration plans for the park and surrounding federal lands.

## Alternative B – Reintroduce Fishers into MORA and NOCA Using Translocation

### *Direct and Indirect Impacts*

Vehicle use associated with reintroduction efforts in MORA and NOCA would likely not disturb other wildlife that inhabit the surrounding areas as wildlife have likely adapted to current levels of noise and human presence associated with the roads and any disturbance produced would be brief and of low intensity. Impacts to other wildlife during fisher monitoring efforts would be similar to the impacts during the releases. The use of fixed-wing aircraft for monitoring would be at altitudes (500 feet agl or 333 feet above canopy, whichever is higher) that would not impact wildlife. Hiking to retrieve dead fishers, install temporary camera or hair-snare stations, or investigate potential den-sites in remote areas of MORA or NOCA could temporarily disturb wildlife; however, these disturbances would be few and brief.

Although fishers and their prey and predators coexisted prior to the extirpation of the fisher from Washington and it is assumed that these species would successfully coexist once again, reintroducing fishers in MORA and NOCA would have a long-term, adverse effect on fisher prey species in these locations. Species potentially affected by the proposed alternative include American marten, snowshoe hares, mountain beavers, small mammals (mice, voles, and shrews), porcupines, squirrels (including Douglas squirrels), woodrats, birds (esp. grouse), reptiles, and insects, all of which are potential prey for fishers. However, because fishers are opportunistic predators and have a varied diet, and occur at a low density, their reintroduction would have adverse, minor effects on most prey populations as impacts would be only slightly perceptible and limited in extent. For example, grouse are commonly found in the diet of fishers and make up as much as ten percent of the diet during the winter in some locations (e.g., British Columbia, Ontario). Together, both avian and mammalian predators may have large impacts on grouse nests and young; however, the relationship between predation and adult density is not clear, and weather during nesting has a substantial effect (Hewitt et al. 2001, Zimmerman et al. 2008). While grouse are important as a prey item to fishers in some locations, fisher predation would not have a substantial influence on the parks' ruffed (*Bonasa umbellus*), sooty (*Dendragapus fuliginosus)* and spruce grouse (*Dendragapus canadensis*) populations as fishers are generalist predators that occur in low densities and prey on a wide variety of small and medium sized mammals and birds. Furthermore, according to Hewitt et al. (2001) fisher predation does not have a substantial influence on grouse populations.

Fisher predators, including coyotes, bobcats, and mountain lions would also be affected by the restoration of fishers. However, considering the low densities of fishers and their predators, the reintroduction of fishers should have only negligible long-term beneficial effects on fisher predators.

The reintroduction of fishers is also expected to restore a native carnivore to the SW and NW Cascades which should help at least partially restore predator-prey relationships and their ecosystem functions within the parks. Therefore, the reintroduction of fishers is expected to have a long-term, negligible to minor, beneficial impact on the overall ecosystem functions in MORA and NOCA as impacts would be only slightly perceptible and limited in extent (Hayes and Lewis 2006).

#### *Cumulative Impacts*

Cumulative impacts on wildlife species of special concern associated with Alternative B would be the same as those associated with Alternative A. Adverse impacts would be negligible to minor due to ongoing maintenance and logging activities in the area, while beneficial impacts would be minor from existing conservation and habitat restoration plans for the parks and surrounding federal lands.

#### *Conclusion*

Because fishers are opportunistic predators, have a varied diet, and occur at low densities, adverse impacts to fisher prey in MORA and NOCA would be long-term and minor, while beneficial impacts to fisher predators would be long-term and negligible. Impacts to the overall ecosystem from the restoration of the fisher are expected to be beneficial, long-term, and negligible to minor, as a native predator-prey relationships would be more fully restored while sufficient habitat would remain functional to maintain viability of all species. Cumulative adverse impacts to wildlife and wildlife habitat would be negligible to minor due to ongoing maintenance and logging activities in the area, while cumulative beneficial impacts would be minor from existing conservation and habitat restoration plans for the parks and surrounding federal lands.

## WILDERNESS

### Issues and Concerns

Fisher reintroduction could have a beneficial impact on the "natural" quality of wilderness character by restoring native species and ecosystem functions within the Mount Rainier and Stephen Mather Wildernesses that MORA and NOCA, respectively, protect and preserve. However, any actions needed to reestablish the fisher, such as radio-collaring for monitoring purposes and potentially using temporary installations to facilitate monitoring, would adversely affect the "untrammeled" and "undeveloped" qualities of wilderness character.

### Affected Environment

In accordance with the Wilderness Act of 1964, the Washington Parks Wilderness Act (1988) designated as wilderness approximately 216,855 acres of MORA as the Mount Rainier Wilderness and approximately 634,614 acres of NOCA as the Stephen Mather Wilderness. An additional 5,226 acres of NOCA were also designated as potential wilderness under this Act, to be converted to wilderness upon the removal of non-conforming uses. Following the completion of the Ross Lake National Recreation Area General Management Plan, NOCA was able to administratively convert 3,359 acres of the 5,226 acres of potential wilderness to designated wilderness in 2012. Today, approximately 97 percent of MORA and 94 percent of NOCA are designated wilderness. Both wilderness boundaries abut roads and developed areas within MORA and NOCA, generally beginning one hundred feet from unpaved roads and two hundred feet from the center line of paved roads and developed areas and in MORA and 50 feet from the center line of roads and 500-700m above the reservoirs and associated developments in NOCA. The Mount Rainier Wilderness also contains the Butter Creek Research National Area (RNA), which was established, prior to wilderness designation, in 1942. This RNA includes approximately 2,000 acres in the Butter Creek Watershed, located in the Tatoosh Range in the southern portion of the park.

#### Wilderness Character

Agencies responsible for administration of designated wilderness are required by law to preserve the wilderness character of the area. Based on the descriptions of wilderness in the Wilderness Act of 1964, the Aldo Leopold Research Institute (an interagency group representing all four federal agencies that manage wilderness) prepared statutory language in *Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System*, that, along with the 1964 Wilderness Act definitions, specifically articulates the following five qualities of wilderness character:

- **Natural:** wilderness ecological systems are substantially free from the effects of modern civilization.
- **Untrammeled:** wilderness is essentially unhindered and free from modern human control or manipulation.
- **Solitude or a Primitive and Unconfined Type of Recreation:** wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation.
- **Undeveloped:** wilderness retains its primeval character and influence, and is essentially without permanent improvements or modern human occupation.
- **Other Features of Value:** wilderness preserves other tangible features that are of scientific, educational, scenic, or historical value.

The Mount Rainier Wilderness and Stephen Mather Wilderness embody each of these qualities to varying degrees.

### *Untrammeled*

The Mount Rainier Wilderness and Stephen Mather Wilderness are both generally unhindered and free from most human manipulation. However, both parks participate in a number of actions that may trammel wilderness, but are implemented in an effort to protect other qualities of wilderness character. These include: wildlife management, hazard tree management, fire suppression, invasive species management (includes vegetation and non-native fish in mountain lakes), and research activities.

### *Natural*

The Mount Rainier Wilderness and Stephen Mather Wilderness offer a wide array of scenic, natural, and ecological values. These wildernesses encompass the full extent of the diversity of the Mount Rainier and North Cascades landscapes of glacial ice and snow, high elevation lakes, old growth forests, river headwaters, streams and waterfalls, abundant wetlands, summertime flower-filled subalpine meadows, and rock scree slopes with perennial snow patches.

Although generally in good condition, ecological systems inside the Mount Rainier and Stephen Mather Wildernesses have been and continue to be affected by actions beyond the wilderness boundary. For example, both wildernesses support a number of threatened and endangered species (eight plant species in MORA and ten plant species in NOCA are listed by Washington State as vulnerable; 34 mammal, bird, amphibian, and fish species in MORA and NOCA are listed as threatened or endangered by the state and/or federal government) which have been historically impacted by human actions outside of wilderness. A number of species are also now considered extirpated from the parks (Biek, 2000); five species are known to be extirpated from the Mount Rainier Wilderness (Canada lynx, fisher, gray wolf, grizzly bear, and wolverine) and one is known to be extirpated from the Stephen Mather Wilderness (fisher). Similarly, invasive species can be found throughout both wildernesses. Out of approximately 1,367 vascular and non-vascular species in MORA and 1,675 vascular and non-vascular species in NOCA, at least 152 and 232 of them, respectively, are non-native (NPS n.d.b); the number of invasive plants within the wildernesses is an unknown, but assumed to be a lesser, amount. While there are no known mammals, reptiles, or amphibians that are non-native species in the area; the barred owl, an eastern species that has expanded its range westward, can be found in both wildernesses, and three non-native fish species are found within mountain lakes in the Mount Rainier and Stephen Mather Wildernesses, a remnant of past stocking practices. Opossum has also been documented in MORA, but outside of wilderness, near the park boundary by Ashford. These invasive species threaten the natural processes of the Mount Rainier and Stephen Mather Wildernesses in that they have the potential to out-compete native species – particularly in light of climate change, create monocultures in once diverse habitats, and substantially alter the wildland fire regime.

The impact of climate change on natural processes is also a growing concern within both wildernesses. Impacts include decreased snow cover, glacial retreat, decreased summer stream flow, increased frequency and magnitude of floods, increased stream temperature, rising tree line, changes in phenology, and longer growing seasons.

### *Undeveloped*

The "undeveloped" quality of wilderness character in the Mount Rainier and Stephen Mather Wildernesses is generally good; however both wildernesses contain a number of administrative and recreational structures that impact this quality of wilderness character. These facilities in the Mount Rainier Wilderness include: signs, patrol cabins, trail shelters, fire lookouts, toilets, approximately 37 designated camps with site markers and access trails, and a system of about 262 miles of designated trails containing 693 culverts, 577 bridges, 4,411 feet of trail puncheon bridges, numerous rock walls, water

bars, drainage ditches, and other historic and non-historic constructed features. In addition, there are approximately 166 way trails (user created travel routes) in the MORA wilderness and an unknown number of "social" trails created by recreational users. Facilities in the Stephen Mather Wilderness include signs, historic fire lookouts and trail shelters/cabins, toilets (wallowa and composting), radio repeaters, SnoTel monitoring stations, a temporary road (last mile of Thornton Lakes Road), approximately 100 designated camps with site markers and access trails, and a system of over 350 miles of designated trails containing culverts, bridges, puncheon, rock and log-lining and other historic and non-historic constructed features. There are also a number of permanent research and monitoring plots in both wildernesses. For example, temperature data loggers have been placed on mountain lakes, vegetation plots include rebar and aluminum tags, and geologic monitoring at MORA includes seismic and GPS stations at several locations around the mountain.

Motorized equipment and vehicles, such as chainsaws and helicopters, are also used for administrative purposes within both Mount Rainier and the Stephen Mather wilderness, consistent with minimum requirement analysis, which negatively impact the undeveloped qualities of these wildernesses. In the last five years (2009-2013), MORA and NOCA have averaged an annual 98.6 and 192.7 hours of flight time over the parks, respectively.[5] At MORA, these flights are often staged out of Kautz Creek, Tahoma Woods, Paradise area, or Ranger Field (outside of the park), and at NOCA, these flights are often staged out of the Marblemount Ranger Station (outside the park), Newhalem gravel pit, Diablo or Ross Lake Overlooks, Colonial Creek Boathouse, Hozomeen, Cascade Pass Trailhead, Bridge Creek or Canyon Creek Trailheads (outside the park), Swamp Creek gravel pit (outside the park), or the Stehekin Airstrip (Kessler, pers. comm., 2014; Bush, pers. comm., 2014). A large percentage of the flights at both parks are with smaller, lightweight helicopters such as a McDonald Douglas MD500D or 530F. In addition to NPS administrative use, non-NPS aircraft, such as military, commercial, and private sector aircraft, fly over the Mount Rainier and Stephen Mather Wildernesses every year. Currently, five commercial air tour operators are permitted to fly over MORA with a total limit of 114 flights. However, few flights are actually conducted by these operators. Two air tour operators exist at NOCA – primarily for the purposes of transportation to and from Stehekin over Lake Chelan; however, few, if any, of these flights traverse over the park and the Stephen Mather Wilderness.

#### *Opportunities for Solitude or Primitive and Unconfined Recreation*

Opportunities for solitude within the Mount Rainier and Stephen Mather Wildernesses are abundant. Local topography, dense vegetation, and spacing of campsites and trails within the wilderness provide a sense of remoteness from the sights and sounds of other people that may be nearby. Night sky visibility is excellent at lower elevations but diminishes at higher elevations where light pollution becomes visible from the Seattle-Tacoma and Vancouver, British Columbia metropolitan areas. The natural soundscape is in relatively good condition, though noise intrusions occur from aircraft, motorboats, highway traffic, and NPS administrative activities (see *Acoustic Environment / Soundscapes* on page 83). Aircraft noise can be heard throughout the wilderness at any time of day, but motorboat (NOCA only) and highway noise significantly drops during nighttime hours. The source of NPS-generated noise typically includes chainsaw use to support trail maintenance activities, equipment used to maintain roads near the wilderness boundary, and aircraft use to support fire management, trails, search and rescue, and other administrative activities.

[5] Since 1991, NOCA has averaged 166.6 hours of flight time over the park, ranging from 87.5 hours in 2002 to 430.2 hours in 2010. 2010 was an extremely busy year for flights; the next two busiest flight years were in 2007 with 305.6 hours and in 2009 with 243.2 hours (Bush, pers. comm., 2014). Since 2000, MORA has averaged 138.8 hours of flight time over the park, ranging from 54.5 hours in 2000 to 371.6 hours in 2005 (Kessler, pers. comm., 2014).

Opportunities for primitive and unconfined recreation are reduced by a number of facilities that decrease self-reliant recreation and policies that place limits on use and activities within wilderness, such as the backcountry permit system, group size restrictions, limitations on the use of campfires, food storage policies, and restrictions on capacities for designated campsites in both parks. While some of these facilities and policies adversely impact opportunities for primitive and unconfined recreation, they can also increase opportunities for solitude by dispersing visitors throughout the wilderness.

#### *Other Features of Value*

The cultural resources of the Mount Rainier and Stephen Mather Wildernesses are also outstanding and include valuable features such as the Wonderland and Northern Loop trails (part of the National Historic Landmark District (NHLD)) in MORA and historic fire lookouts in NOCA. Both wildernesses document over 8,500 years of human presence on the landscape and offer glimpses into the distribution of people across a high mountain landscape over centuries of ecological changes in climate and topography. In addition, both wildernesses have been and continue to serve as ongoing objects of scientific study – offering outstanding opportunities to understand vegetation, wildlife, fire ecology, geology, and water resources.

## Impacts of the Alternatives

The analysis of impacts on wilderness is primarily qualitative and is based on the five wilderness qualities of wilderness character, defined and explained above (see *Wilderness Character* on page 77).

- Impacts to the **natural** quality of wilderness character are based on the potential of fisher reintroduction to restore the natural processes of ecological systems within wilderness to a state in which they are substantially free from the effects of modern civilization.
- Impacts to the **untrammeled** quality of wilderness character are related to the amount and degree of human manipulation within wilderness that would occur from fisher reintroduction.
- Impacts to the **solitude or a primitive and unconfined type of recreation** quality of wilderness character are based on potential impacts to the visitor experience and recreational amenities within wilderness such as visitor use nights and number of backcountry camps. Impacts to this quality of wilderness character are discussed under *Acoustic Environment / Soundscapes* and *Visitor Use and Experience* later in this chapter. Impacts to wilderness users who would experience firsthand the potential impacts on wilderness values during their wilderness visit and to other members of the public who may not visit the wildernesses but who would still be impacted simply by knowing that fisher reintroduction efforts were occurring, are also discussed under *Visitor Use and Experience* later in this chapter.
- Impacts to the **undeveloped** quality of wilderness character are related to the amount of installations or degree of mechanized use proposed under this plan within wilderness. This includes impacts from temporary camera and hair snare stations and aerial telemetry flights.
- Impacts to **other features of value** are related to the amount of scientific data gathered through these proposed reintroductions and the potential for this information to increase scientific understanding of wilderness ecosystems and enhance educational opportunities. The proposed actions associated with fisher reintroduction would not impact any archaeological, historical, or other cultural resources within MORA and NOCA.

### Alternative A – No Action Alternative

#### *Direct and Indirect Impacts*

Because no action would be taken in NOCA or the NW Cascades under Alternative A, there would be no additional impacts to the Stephen Mather Wilderness from this alternative. Existing impacts to the natural quality of wilderness character would perpetuate into the future from the continued absence of fishers within the wilderness ecosystem.

While no action would be taken to reintroduce fishers directly into MORA or NOCA, WDFW reintroduction efforts would proceed to the south of MORA and in the SW Cascades reintroduction area under Alternative A, and eventually fishers are expected to establish self-sustaining populations in and around the Mount Rainier Wilderness. This anticipated restoration of the fisher in the Mount Rainier Wilderness would have a short-term, minor, adverse impact on the untrammeled quality of wilderness character because of the intentional human action to manipulate the environment but would have a minor long-term beneficial impact on the natural quality of the Mount Rainier Wilderness as it would improve the processes and biodiversity of this wilderness ecosystem by restoring a native predator to this wilderness, having positive cascading effects on other species present.

Additionally, WDFW would proceed with monitoring reintroduced fishers in areas where they travel and establish home ranges, similar to those actions outlined in Alternative B, which could impact the wilderness character of the Mount Rainier Wilderness. Although these impacts to the wilderness character of the Mount Rainier Wilderness would be similar to those from Alternative B, they would likely be delayed and would be of reduced intensity because the dispersal of fishers to MORA is expected to be slower under this alternative and radio-telemetry devices may no longer be operational when fishers finally immigrate into the park. If fishers with VHF radio-transmitters immigrate into MORA shortly after a release outside park boundaries, some adverse, short-term, negligible impacts to the untrammeled quality of wilderness character would occur due to the presence of tracking devices on wild animals within the wilderness, and adverse, short-term, negligible to minor impacts to the undeveloped quality of wilderness character would occur from the presence of tracking devices on individual fishers and WDFW weekly telemetry flights with fixed wing aircraft, which would increase the number of annual flight hours generated by administrative aircraft over the Mount Rainier Wilderness. During the OLYM fisher reintroduction, 192.9 to 254.4 hours of fixed-wing flights occurred annually over the park and surrounding lands in association with fisher monitoring efforts, averaging 220.75 hours annually, less than half of which were over the park (Happe, pers. comm., 2014a). It is assumed that only a small percentage of these flight hours would occur at MORA due to the limited number of fishers that would be expected in the park during the initial years of reintroduction (OLYM reintroduced approximately 90 fishers into the park; none would be reintroduced into MORA under this alternative and only 80 would be reintroduced on surrounding lands).

Because of WDFW's monitoring efforts, scientific understanding of reintroduction efforts would be enhanced, a minor, long-term, benefit to other features of value, but little to no educational opportunities would be improved in the Mount Rainier Wilderness under this alternative.

For impacts to solitude and primitive and unconfined recreation, please see impacts to *Acoustic Environment / Soundscapes* and *Visitor Use and Experience* later in this chapter.

#### *Cumulative Impacts*

It is assumed that both wildernesses would continue to experience negligible to minor adverse impacts from ongoing NPS management activities, including: hazard tree management, fire management,

invasive species treatment, and research (all impacts to the wildernesses' untrammeled qualities); the absence of native species, presence of non-native species, and impacts to the biophysical processes from climate change (all impacts to the wildernesses' natural qualities); the presence of structures and use of motorized equipment and mechanized use within wilderness (all impacts to the wildernesses' undeveloped qualities); and noise and light intrusions from surrounding lands and NPS visitor use policies (all of which impact opportunities for solitude and primitive and unconfined recreation within the Mount Rainier and Stephen Mather Wildernesses).

#### *Conclusion*

There would be no impacts to the Stephen Mather Wilderness under this alternative; however, the wilderness would continue to experience cumulative negligible to minor, adverse impacts.

Impacts to the untrammeled and undeveloped qualities of the Mount Rainier Wilderness would be adverse, short-term, and negligible to minor, but the natural and other features of value qualities of wilderness character would experience long-term minor beneficial impacts under this alternative. The wilderness would also continue to experience cumulative negligible to minor adverse impacts from ongoing activities.

### Alternative B – Reintroduce Fishers into MORA and NOCA Using Translocation

#### *Direct and Indirect Impacts*

Under Alternative B, the NPS and WDFW would partner to reintroduce fishers within non-wilderness areas of MORA and NOCA with the goal that fishers would establish self-sustaining populations in and around the Mount Rainier and Stephen Mather Wildernesses. The successful restoration of fishers would have a short-term, minor, adverse impact on the untrammeled quality of wilderness character as the action would require active management in wilderness, but this restoration would eventually result in minor, long-term beneficial impacts to the natural quality of both the Mount Rainier and Stephen Mather Wildernesses as it would improve the processes and biodiversity of these wilderness ecosystems by restoring a native predator to these wildernesses which would have positive cascading effects on other species present.

Based on the distance that fishers traveled during the reintroduction effort at OLYM in 2008-2010 – where fishers were documented traveling up to approximately 67 miles from release sites – released fishers are expected to disperse throughout suitable habitat in both parks (see Figures 2.1 and 2.2). If this occurs, some adverse, short-term, negligible to minor impacts to the untrammeled quality of wilderness character would occur due to the presence of tracking devices on wild animals within the wilderness (in comparison to Alternative A, it is more likely that trackable fisher would be present in both wildernesses due to the proximity of candidate release sites), and adverse, short-term, minor impacts to the undeveloped quality of wilderness character would occur from monitoring efforts tied to the presence of fisher including: tracking devices in/on fishers, telemetry flights, and camera and hair snare stations. Specifically, the proposed fixed-wing flights associated with aerial telemetry would increase the number of annual administrative flight hours over the Mount Rainier and Stephen Mather Wildernesses. During the OLYM fisher reintroduction, approximately 192.9 to 254.4 hours of fixed-wing flights occurred annually over the park and surrounding lands in association with fisher monitoring efforts from 2008-2010, averaging 220.75 hours annually. Less than half of these hours were over the park (Happe, pers. comm., 2014a). Although more fishers were reintroduced at OLYM (goal of 100) than proposed for MORA and NOCA (goal of 80 in each park) under this alternative, this activity could increase the annual administrative flight hours at MORA and NOCA by as much as 111.9 percent

and 57.3 percent (based on five year average of administrative flights at both parks), respectively, for the three years during and following each reintroduction in the SW and NW Cascades. In addition, during and following aerial telemetry monitoring, the NPS and WDFW would install temporary camera stations and/or hair-snare stations in locations where den-sites are thought to be in order to monitor den-sites and evaluate the success of the reintroduction. These stations would be small, located in remote areas, and placed out-of-sight of visitors, but they would temporarily increase the number of installations in the wildernesses.

Finally, the monitoring activities that would accompany the reintroductions would inform future reintroduction efforts of native species – a long-term, minor benefit to scientific understanding of these processes and thereby the other features of value quality of wilderness character. This information could also be used to enhance education and outreach in and around both wildernesses, a negligible to minor beneficial impact on other features of value for both the Mount Rainer and Stephen Mather Wildernesses.

For impacts to solitude and primitive and unconfined recreation, please see impacts to *Acoustic Environment / Soundscapes* and *Visitor Use and Experience* later in this chapter.

#### *Cumulative Impacts*

It is assumed that both wildernesses would continue to experience negligible to minor adverse impacts from ongoing NPS management activities, including: hazard tree management, fire management, invasive species treatment, and research (all impacts to the wildernesses' untrammeled qualities); the absence of native species, presence of non-native species, and impacts to the biophysical processes from climate change (all impacts to the wildernesses' natural qualities); the presence of structures and use of motorized equipment and mechanized use within wilderness (all impacts to the wildernesses' undeveloped qualities); and noise and light intrusions from surrounding lands and NPS visitor use policies (all of which impact opportunities for solitude and primitive and unconfined recreation within the Mount Rainier and Stephen Mather Wildernesses).

#### *Conclusion*

Impacts to the untrammeled and undeveloped qualities of the Mount Rainier and Stephen Mather Wildernesses would be adverse, short-term, and negligible to minor, but the natural and other features of value qualities of these wilderness' characters would experience long-term, negligible to minor, beneficial impacts under this alternative. Both wildernesses would also continue to experience cumulative negligible to minor adverse impacts from ongoing activities.

## ACOUSTIC ENVIRONMENT / SOUNDSCAPES

### Issues and Concerns

The acoustic environment is defined as the *physical sound resources* (i.e., natural and cultural or historical sounds), regardless of their audibility, at a particular location. The *human perception* of that acoustic environment is defined as the soundscape. Natural sounds are an important value for park visitors to MORA and NOCA. In addition, many wildlife species depend on sounds as part of complex communication networks. In habitats where wildlife vocalizations signify mating calls, danger from predators, or territorial claims, hearing these sounds is important to animal reproduction and survival. Therefore, noise, defined as un-natural or human-caused sound, can impact both visitor experience and natural ecosystem functions. The NPS is required to preserve natural soundscapes of parks, which are composed of the natural sound conditions that exist in absence of any human-produced noises.

Actions needed to reestablish the fisher, such as vehicles used to access release sites and the use of aerial telemetry flights for monitoring purposes, could have an adverse impact on the acoustic environment and soundscape in MORA and NOCA.

## Affected Environment

Within the backcountry zones and wilderness areas of MORA and NOCA, natural ambient sounds tied to physical processes (such as wind and running water) and biotic resources (such as insects, frogs, birds, and mammals) predominate. However, sounds from developed areas and human uses within and above wilderness can be heard in these backcountry zones and wilderness areas at both parks. Based on soundscape monitoring in MORA and NOCA, the primary human-caused sounds in these developed areas are tied to power generation and transmission equipment (in NOCA), traffic along roads, water craft on reservoirs (in NOCA only), road maintenance activities, and aircraft from both park administrative, military, and commercial uses.

Although originating from developed areas, these sounds can travel far and are often magnified within valleys due to topography (deep, narrow valleys surrounded by higher ridges and peaks), where sounds from valley floors are amplified as they reverberate against valley walls and/or steep cliffs. For example, a party climbing Colonial Peak in NOCA at 7,444 feet can clearly hear motorcycles on the highway below, even though they are well within designated wilderness and thousands of feet above the highway corridor. While in certain areas, such as beside a major river, the natural sound level is great enough to overcome high levels of human sounds, some developed areas of the parks (like Colonial Creek Campground in NOCA) are rarely free of human-induced sounds for any extended length of time. See *Table 3.5: Extrinsic Sounds near Candidate Release Sites in MORA and NOCA* for more information on the percentage of time that extrinsic (human-caused) sounds are audible near potential fisher release sites in the parks (these sites are used as examples of sound levels in suitable fisher habitat in the parks).

**Table 3.5: Extrinsic Sounds near Candidate Release Sites in MORA and NOCA**

| Candidate Release Site* | % Time Audible (%) | | Max Noise Free Interval[b] (mm:ss) |
|---|---|---|---|
| | Extrinsic Sounds[a] | Aircraft Sounds | |
| **Upper Nisqually River** | | | |
| Trail of Shadows (MORA001) | 44.5 | 9.2 | 2:59 |
| **Upper Ohanapecosh River** | | | |
| Shriner's Trail (MORA004) | 13.7 | 10.5 | 15:25 |
| **Lower Thunder Creek** | | | |
| Colonial Creek Campground (NOCA011) | 79.1 | 3.7** | 1:22 |
| **North Fork of the Cascade River** | | | |
| Cascade Pass (NOCA006) | 16.3 | 15.6 | N/A |
| **Ross Lake and the Big Beaver Drainage** | | | |
| Big Beaver Valley (NOCA014) | 9.6 | 8.8 | 60:00 |

Source: NPS 2008a, NPS 2008b, Winings and Neel 2013, NPS 2009

a) Extrinsic sounds are any sound not forming an essential part of the park unit, or a sound originating from outside the park boundary.
b) The average noise free interval is the period of time between extrinsic sound events.
*Data for MORA is for July and September 2009; data NOCA is for June and September of 2008, 2009, and 2010.
**Low percentages of audible aircraft sounds may be due to aircraft noise being masked by other extrinsic sounds.

As evident in Table 3.5 above, aircraft sounds – some of which are tied to NPS administrative use – account for a large portion of the extrinsic sounds in backcountry and/or wilderness areas of MORA and NOCA (see *Wilderness* for more information on administrative flights). While aircraft sounds come from a variety of sources such as commercial jets, prop airplanes, and helicopters, cumulatively these

flights have an effect on the acoustic environment and soundscapes within MORA and NOCA as they can be audible for a measurable percentage of time within the backcountry, specifically in areas where suitable fisher habitat exists within the parks. For example, at the Big Beaver Valley monitoring station in NOCA, a back country camp at low elevation, aircraft sounds were audible for 8.8 percent of the monitoring period. Small fixed-wing aircraft were audible for 1.6 percent of the monitoring period at this location (Winnings and Neel 2013).

Beyond these impacts to the acoustic environment from human activity, MORA and NOCA are some of the best examples of natural soundscapes found anywhere in the national park system. Looking at soundscape data collected at MORA and NOCA between 2008 and 2010 (June-September), the average existing sound levels are below 40 decibels near the potential release sites for fishers in the parks (again, release sites are used as an example of sounds in suitable fisher habitat in the parks), and natural sound levels are only minimally impacted by human-caused sounds in most locations. The greatest difference (and therefore largest impact from human-caused sounds) between natural and existing sound levels near candidate release sites is seven decibels during the day at Colonial Creek Campground in NOCA; the next greatest difference is a two decibel increase at Colonial Creek Campground at night (see *Table 3.6: Soundscapes near Candidate Release Sites in MORA and NOCA* below). A ten dB increase in the measured sound level is typically perceived as being twice as loud, and a ten dB decrease is perceived as half as loud (Minnesota Pollution Control Agency 1999; endpcnoise.com n.d.).

**Table 3.6: Soundscapes near Candidate Release Sites in MORA and NOCA**

| Candidate Release Site | Average Existing Sound Levels (dBA)[a] | | Average Natural Sound Levels (dBA)[b] | |
|---|---|---|---|---|
| | Day (0700-1859) | Night (1900-0659) | Day (0700-1859) | Night (1900-0659) |
| **Upper Nisqually River** | | | | |
| Trail of Shadows (MORA001) | 35.9 | 33.3 | 34.0 | 33.1 |
| **Upper Ohanapecosh River** | | | | |
| Shriner's Trail (MORA004) | 34.6 | 35.3 | 34.2 | 35.2 |
| **Lower Thunder Creek** | | | | |
| Colonial Creek Campground (NOCA011) | 32 | 23 | 25 | 21 |
| **North Fork of the Cascade River** | | | | |
| Cascade Pass (NOCA006) | 35.1 | 35.3 | 34.6 | 35.2 |
| **Ross Lake and the Big Beaver Drainage** | | | | |
| Big Beaver Valley (NOCA014) | 27 | 27 | 27 | 27 |
| Source: NPS 2008a, NPS 2008b, Winings and Neel 2013, NPS 2009 | | | | |

a) Otherwise known as the A-weighted median existing ambient statistics or L50, this metric describe average sound levels for daytime and nighttime periods at each site. For comparison, nighttime sound level in a typical residential area is about 40 dBA.
b) Otherwise known as the A-weighted median natural ambient statistics or Lnat, this metric describes natural ambient levels for daytime and nighttime periods at each site. Lnat is an estimate of the remaining sound energy over a particular time period when all extrinsic or anthropogenic noises are removed from the existing ambient (L50). The greater the difference between Lnat and LL50, the more extrinsic noises impact the existing, natural sound levels.

For context, nearly all agencies and organizations with authority over noise-producing sources (including the World Health Organization and the National Research Council) use 55 dB as the threshold for defining day-night noise levels in urban areas, and the World Health Organization recommends that noise levels inside bedrooms remain below 45 dBA (Schomer 2001; Berglund et al. 1999). Table 3.7 below also highlights examples of sound levels in other national parks; 40 dBA, louder than both the average existing and average natural sound levels at all monitoring plots near candidate

releases sites, is comparable to crickets in Zion National Park. While sound levels in MORA and NOCA certainly exceed these thresholds at times, the percentage of time above these metrics is minimal. For example, sound levels near Cascade Pass in NOCA exceeded 45 dBA for 1.24 percent of daytime hours (less than 9 minutes) and exceeded 53 dBA for 0.28 percent of daytime hours (approximately 2 minutes) during monitoring efforts in 2008 (NPS 2008a).

**Table 3.7: Examples of Sound Levels Measured in National Parks**

| Decibel level (dBA) | Sound Source |
|---|---|
| **10** | Volcano crater (Haleakala NP) |
| **20** | Leaves rustling (Canyonlands NP) |
| **40** | Crickets at 5 m (Zion NP) |
| **60** | Conversational speech at 5 m (Whitman Mission NHS) |
| **80** | Snowcoach at 30 m (Yellowstone NP) |
| **100** | Thunder (Arches NP) |
| **120** | Military jet, 100m above ground level (Yukon-Charley Rivers NP) |
| **126** | Cannon fire at 150m (Vicksburg NMP) |

## Impacts of the Alternatives

### Alternative A - No Action Alternative

#### *Direct and Indirect Impacts*

Under Alternative A, no reintroduction or associated monitoring actions would occur in the NW Cascades in the foreseeable future. Therefore, there would be no effect to the existing acoustic environment or soundscapes in NOCA from fisher reintroduction.

However, while no action would be taken to reintroduce fishers directly into MORA or NOCA, WDFW reintroductions and monitoring efforts would proceed to the south of MORA in the SW Cascades reintroduction area, and eventually fishers are expected to establish self-sustaining populations in and around the park. WDFW monitoring efforts would eventually be extended to the park as well. If a reintroduced fisher immigrates into MORA within the first two years of reintroduction (when the VHF transmitter is still operable), fixed-wing flights associated with WDFW monitoring actions would increase the noise typically generated by aircraft over MORA. As discussed previously under *Wilderness* earlier in this chapter, aerial telemetry could increase annual administrative flight hours in MORA, and during low-level flights when a fisher's location is being pinpointed, aircraft noise will be at increased levels. Typically, a small fixed-wing aircraft, such as a Cessna 172, emits approximately 74 dBA at about 1,500 feet agl (FAA 2006). However, when flying at lower elevations, such as 500 feet agl (as proposed in this alternative), a fixed-wing aircraft would be almost twice as loud, emitting approximately 83 dBA. Considering the FAA recommends flying at 2,000 feet agl over MORA out of consideration for the wilderness resources that the park protects, this increase in noise generated by fixed-wing aircraft, as well as the anticipated increased use of fixed-wing aircraft over the wilderness, would result in adverse, short-term, negligible to minor impacts on the acoustic environment at MORA as these flights, though perhaps not occurring frequently, would likely be slightly perceptible but limited in extent. That said, it is important to note that such low elevation flights of 500 feet agl would only be associated with a strong, localized signal, indicating that the transmitter is very close. During the majority of the flight time, aerial telemetry flights would be at higher elevations.

Overall, noise impacts to visitors would vary based on the source of the noise, its location and visitors' proximity to the source, and the likelihood of exposure (timing, etc.). In general, natural sounds would

prevail under this alternative; the increased use of aircraft and increased noise associated with monitoring efforts would be limited and transient and would somewhat be mitigated by noise attenuation factors (particularly distance). However, as these activities could occur throughout the visitor use season, depending on when the fisher is detected in the park, this alternative would result in adverse, short-term, negligible to minor impacts on soundscapes for visitors at MORA.

#### *Cumulative Impacts*

Impacts to the soundscapes in MORA and NOCA would continue to occur from other uses, such as sounds from traffic and construction on roads, motorboats on reservoirs (NOCA only), and flights from commercial airlines, tour operators, military aircraft, private aircraft, and NPS administrative uses. While there would be no additional impacts to the acoustic environment in NOCA since fishers would not be introduced in the NW Cascades, the acoustic environment in both MORA and NOCA would cumulatively experience adverse, short-term, minor impacts from ongoing activities.

#### *Conclusion*

There would be no impacts to soundscapes in NOCA as there would be no increase to the natural or human-caused sound levels above what currently exists. Noise impacts from fisher reintroduction efforts south of MORA would be adverse, short-term, and negligible to minor. These impacts would be localized, primarily resulting from the use of aerial fixed-wing flights, and would occur, though transient, regularly throughout the year. Cumulative impacts at both parks would be adverse, short-term, and minor.

### Alternative B — Reintroduce Fishers into MORA and NOCA Using Translocation

#### *Direct and Indirect Impacts*

Under Alternative B, fishers would be reintroduced within the Nisqually River and Ohanapecosh River corridors in MORA (southern half of the park) and the Thunder Creek, Cascade River, and Big Beaver Creek drainages in NOCA (middle to southwest half of the park complex). Access to release sites would be via road and, for the Big Beaver Valley in NOCA, by motorboat. Preferably, fishers would be released in late fall to early winter when visitation is low, although fishers may be released as late as February or March. Multiple releases could occur at any candidate release site within one season. Accessing fisher release sites via roads would result in a slight increase in the amount of vehicular use along Highway 12 in MORA and Highway 20 and the Cascade River Road in NOCA. Similarly, accessing the release site in the Big Beaver Valley in NOCA would increase motorboat use on Diablo and Ross Lakes. Despite these increases in use, vehicular and motorboat use related to fisher releases would be almost undetectable given background traffic levels and the comparable number of trips associated with reintroduction and monitoring efforts. However, because the majority of this vehicular/motorboat use would occur during the winter, when use along the roads and reservoirs is lower (particularly true at NOCA, where Highway 20 is closed during the winter), these uses would have a negligible, short-term, adverse impact on the acoustic environment surrounding the road corridors in both parks and the southern half of Ross Lake in NOCA. If fishers are released during the fall or spring, when there is more vehicle use in MORA and NOCA, the vehicles and motorboats used for the release efforts would not generate noise above existing levels.

Based on the distance that fishers traveled during the reintroduction effort at Olympic National Park (OLYM) in 2008-2010 – where fishers were documented traveling up to approximately 67 miles from release sites – fishers that would be released directly in MORA and NOCA under Alternative B are expected to disperse throughout suitable habitat in both parks (see Figure 2.2). The associated

monitoring with this dispersal, in particular the use of fixed-wing aircraft for telemetry purposes, would both increase the number of annual flight hours and the noise typically generated by aircraft over MORA and NOCA. As discussed previously under *Wilderness*, these flights could increase the annual administrative flight hours at MORA and NOCA by as much as 111.9 percent and 57.28 percent (based on five year average of administrative flights at both parks), respectively, for three years during and following reintroductions in the SW and NW Cascades. In addition, these fixed-wing flights would be almost twice as loud as other noise associated with aircraft in the parks. Typically, a small fixed-wing aircraft, such as a Cessna 172, emits approximately 74 dBA at about 1,500 feet agl (FAA 2006). However, when flying at lower elevations, such as 500 feet agl (as proposed under this alternative), a fixed-wing aircraft would be almost twice as loud, emitting approximately 83 dBA. This increase in noise generated by fixed-wing aircraft, as well as the increased use of fixed-wing aircraft associated with implementing this alternative, would result in adverse, short-term, minor impacts on the acoustic environments at MORA and NOCA as these flights and their associated noise would likely be measureable but limited in extent. Such low elevation flights of 500 feet agl would only be associated with a strong, localized signal, indicating that the transmitter is very close. Most flights, when signals from fishers are not detected, aerial telemetry flights would be at higher, more standard, elevations.

Overall, noise impacts to visitors would vary based on the source of the noise, its location and visitors' proximity to the source, and the likelihood of exposure (timing, etc.). In general, natural sounds would prevail under this alternative. Noise related directly to fisher releases would be infrequent or absent and mostly immeasurable, resulting in adverse, short-term, negligible impacts on soundscapes, as activities associated with releases would occur outside the high visitor use season. The increased use of aircraft and increased noise associated with monitoring efforts would also be limited and transient and would somewhat be mitigated by noise attenuation factors (particularly distance). However, as these activities would occur throughout the visitor use season (even though limited primarily to weekdays), they would result in adverse, short-term minor impacts on soundscapes for visitors at MORA and NOCA.

#### *Cumulative Impacts*

Impacts to the acoustic environment and soundscapes in MORA and NOCA would continue to occur from other uses, such as sounds from traffic and construction on roads, motorboats on reservoirs (NOCA only), and flights from commercial airlines, tour operators, military aircraft, private aircraft, and NPS administrative uses. These current and ongoing uses cumulatively have an adverse, short-term, minor impact on the acoustic environment and soundscapes in both parks.

#### *Conclusion*

Noise impacts from fisher reintroduction efforts would be adverse, short-term, and negligible to minor. These impacts would be localized, primarily resulting from the use of aerial fixed-wing flights. Cumulative impacts would be adverse, long- and short-term, and minor.

## VISITOR USE AND EXPERIENCE

### Issues and Concerns

Fisher reintroduction could beneficially affect visitor experiences in MORA and NOCA by enhancing opportunities to experience a rare, forest dwelling species in a national park and wilderness setting. Similarly, fisher reintroductions could increase interpretative opportunities to enhance visitor experiences in both parks. As both parks are known for their ecosystem diversity, fisher reintroductions could also beneficially impact experiences for visitors and non-visitors alike as the public would know that a missing component of the ecosystem had been restored.

As a state-listed species, short-term restrictions on public use of the parks may be necessary to enable successful release and establishment of a founding population. However, fishers are not expected to den in locations of high visitor use, reducing the likelihood of impacts to visitors.

## Affected Environment

### Visitation Trends

Visitation to MORA and NOCA has fluctuated annually over the past forty-plus years, mirroring trends throughout the national park system. During the 1990s, the average annual recreation visits to MORA and NOCA were about 1.33 million and 420,000 visitors, respectively. In the early 2000s that average decreased to approximately 1.21 million annual recreational visits to MORA (a nine percent decrease) and increased to approximately 480,000 annual recreational visits to NOCA (a 16 percent increase) (NPS n.d.a). While MORA provides access and recreational opportunities throughout the winter (although NOCA remains open to the public in the winter, access is limited due to the state closure of Highway 20 from October/November through April/May) most of this annual visitation to both MORA and NOCA is seasonal in nature, with 80 percent of all visits to MORA occurring between May and October and 82 percent of all visits to NOCA occurring in June through September (Johnson et al. 1991). Considering projected population growth, particularly in the Pacific Northwest, visitation to both parks is projected to grow over the next 10-15 years as these parks continue to serve as recreational destinations for local communities, including the Seattle-Tacoma metropolitan area.

In addition to annual visitation, MORA, in particular, is highly visible throughout the nation and beyond. As the fifth addition to the national park system, MORA is recognized as an American icon, known throughout the world for its prominent, snow-capped active volcano and world class climbing opportunities. (Approximately six percent of visitors to MORA in 2000 came from foreign countries (Simmons et al. 2001)). Although significantly younger than MORA (MORA was designated in 1899; NOCA designated 69 years later, in 1968), the visibility of NOCA has also increased substantially over the last decade, particularly as the regional population grows. Because of this visibility, the size of the parks' landbases, and the work that each park is involved in, both MORA and NOCA have a large public constituency and a number of partnerships that extend beyond their borders. In completing the public scoping phase of writing this Plan/EA, MORA and NOCA specifically reached out to a known constituency of over 1,100 individuals, businesses, and other agencies, and received approximately 525 emails or letters in response.

### Recreation Resources

Park visitors to both MORA and NOCA participate in a wide array of recreational activities, including scenic driving, wildlife viewing, walks to nearby viewpoints, fishing and boating (in NOCA), hiking and backpacking, camping, horseback riding, mountaineering, climbing, skiing, snowshoeing, and snowmobiling (along Highway 20 in NOCA). For the majority of visitors to MORA and NOCA, who are day-users, popular destinations in the parks include primarily front-country locations such as: Paradise, Longmire, Ohanapecosh, and Sunrise at MORA and the North Cascades Visitor Center, Diablo Overlook, Gorge Overlook Trail, and Newhalem trails in NOCA. While there are a number of front country camps and indoor lodging opportunities in both parks, visitors who venture into the backcountry and spend the night have over 260 miles of trails to explore in MORA, including the historic 93-mile Wonderland Trail, and over 390 miles of trails and 130 backcountry camps to explore in NOCA, many of which lead visitors through lower elevation forest habitat to higher elevation alpine environments. All overnight backcountry use in the parks requires a backcountry permit which is free of charge; reservations, for a fee, can only be made at MORA. The busiest visitor use season in the

backcountries of MORA and NOCA falls between July and September. For example, of the permits issued for the Wonderland Trail between 2009 and 2013, 98.5 percent were within these three months (NPS files). Periodically, trails or camps can be closed by the superintendents of MORA and NOCA out of consideration for visitor and/or resource protection. However, these closures are infrequent, short-term (closures longer than 90 days require notification in the Federal Register), and most often linked to storm damage rather than the protection of wildlife. Since 2009, MORA has temporarily closed a trail only twice for wildlife, which were both related to human safety. At NOCA, a portion of the Hozomeen Lake Trail has been closed between April 1 and May 31 every year since the early 1990s to protect potential nesting loons; and periodic multi-week camp closures have happened over the past 20-plus years to protect and deter bears from sites such as Rainbow Bridge, Big Beaver, South Fork, North Fork, Fireweed, Thunder Basin, Hidden Hand, and Tumwater (36 CFR, Part B; Christophersen, pers. comm., 2014; Braaten, pers. comm., 2014).

While hunting is allowed in Ross Lake and Lake Chelan National Recreation Areas (NRAs), as managed by WDFW in accordance with 36 Code of Federal Regulations, Sec. 2.22, it is not considered a prominent activity, particularly in Ross Lake NRA where hunting represented only 0.1 percent of total activity on average between 2001 and 2009 (NPS 2012b). (Socioeconomic impacts to hunters and trappers have been dismissed as an issue in this Plan/EA for a number of reasons. Please see *Impact Topics Dismissed from Detailed Analysis* on page 17).

### Education and Outreach

MORA and NOCA both provide a variety of interpretive/educational opportunities to park visitors, and both parks host a number of volunteer and youth programs to engage visitors in the stewardship of park resources.

Mount Rainier operates a year-round visitor contact station at Longmire; a year-round visitor center at Paradise, with limited winter hours; and summer only visitor centers at Ohanapecosh and Sunrise. The park also maintains an extensive collection of informative wayside exhibits and bulletin boards throughout the park. In 2013, the Jackson Visitor Center at Paradise served 420,401 visitors, and the Sunrise Visitor Center served 64,874 visitors. Approximately 80,000 visitors use the Ohanapecosh Visitor Center annually; however, it did not open in 2013 due to sequestration. The number and kinds of ranger-led programs offered vary throughout the year at MORA, from guided snowshoe hikes in the winter to guided hikes and walks, children's programming, and illustrated campground programs in the summer. Through the park's active Junior Ranger program, over 4,000 young visitors earn their Jr. Ranger badges each year, and adults can become Citizen Rangers by completing self-guiding quests. In 2013, the park reached 25,951 visitors through 881 ranger-led programs offered primarily in the summer months, and 4,271 kids became Jr. Rangers and many more adults became Citizen Rangers.

MORA also operates their own Education Center out of Tahoma Woods that offers both in-classroom and in-park experiential curriculum-based education programs throughout the school year and youth education programs during the summer months, and the park is currently partnering with the University of Washington to create Mount Rainier Institute, a multi-day immersive program that provides nature-based education rooted in science and aimed at nurturing the next generation of environmental stewards and leaders. In 2013, about a hundred students participated in Mount Rainier Institute pilot programs, part of 6,616 youth who were served by 212 education programs throughout the year. The park also maintains an active presence on the world-wide web through its website, webcams, and main social media outlets: Facebook, Twitter and Flickr. As of July 2014, the park reaches

over 22,100 people on Facebook, over 8,700 on Twitter, and the park has over 1,100 photos on its Flickr page.

NOCA has several visitor contact stations, including: joint visitor contact stations with the USFS in Sedro-Woolley, Glacier, Chelan, and Winthrop; the Wilderness Information Center in Marblemount; the North Cascades Visitor Center and Skagit Information Center (operated by Seattle City Light) in Newhalem; and the Golden West Visitor Center in Stehekin. The park also operates a small visitor contact station in Hozomeen in partnership with British Columbia Parks. While backcountry information and permitting are primarily offered at the centers in Marblemount, Glacier, and Winthrop, the park also provides interpretive opportunities out of the visitor centers in Newhalem, Hozomeen, and Stehekin. These opportunities include interpretive displays, wayside exhibits and kiosks, exploration tables, audio-visual programs, junior-ranger programs, ranger-led programs, interpretive roves, and self- and ranger-guided walks such as Skagit Tours that are offered in partnership with Seattle City Light and the North Cascades Institute. The park also posts a large amount of information on the park's website that is available for visitors and non-visitors alike. In 2013, the park served over 60,000 visitors and offered 51 weekly programs (July-August) to approximately 17,114 visitors in Newhalem and Hozomeen alone. The North Cascades Institute, a non-profit and partner with NOCA, also offers educational programs in NOCA at the Environmental Learning Center (ELC) on Diablo Lake. In 2013, the ELC provided 12 unique educational programs, from Mountain School for fifth graders to Youth Leadership Adventures for high school students and the Sourdough Speaker Series for adults, to over 7,766 visitors. These programs range from no charge to $203.00 per person, per night (Brown, pers. comm., 2014).

Both MORA and NOCA also provide volunteer opportunities and operate youth programs. In 2013, 1,784 volunteers contributed 62,736 hours of service to MORA and 492 volunteers contributed 31,898 hours of service to NOCA. MORA and NOCA also supported 12 and 17 youth programs in 2013, respectively, most of which included a service work component. These opportunities and programs are designed to connect the park with members of the surrounding communities by making them aware of the park and its opportunities for recreation and stewardship.

### Public Values Concerning Fisher Reintroduction at MORA and NOCA

Wildlife resources and their habitats are managed for the benefit of the general public; thus, the human dimensions of wildlife conservation are important for understanding how and why these resources are managed. As relayed in Table 3.8 below, the public has a number of distinct attitudes toward wildlife, some of which are positive and others of which are negative. Most people typically hold more than one attitude toward an issue and react differently in different situations. Nonetheless, it is possible to identify in most people predominant characteristics of a primary attitude toward an issue. For example, ranchers tend to have a utilitarian (value measured in terms of usefulness) attitude towards animals, while scientists tend to take a scientific view (Kellert 1976).

**Table 3.8: Wildlife Values**

| Value | Definition | Characteristics |
|---|---|---|
| **Positive Values** | | |
| Aesthetic | Related to an animal's inherent natural beauty or artistic appreciation of a species. | Difficult to assess or measure, but important to conservation. Wildlife in their native habitats have aesthetic value. |
| Recreational | Assigned to wildlife-related sports or hobbies. | Subdivided into consumptive and nonconsumptive. Hunting is the most common consumptive use of wildlife; birdwatching and photography are nonconsumptive uses. |

| Value | Definition | Characteristics |
|---|---|---|
| Ecological | Related to the relationship of a species to its environment, community, or ecosystem. | Every species plays a role in its natural community and ecosystem. For example, deer and elk have the ability to influence successional patterns of plant communities. |
| Educational, Scientific | Related to learning and teaching about wildlife. | Wildlife can be used to teach principles of population dynamics, ecosystem management, harvest management, and endangered species management. |
| Utilitarian | Characteristics that make wildlife useful to humans. | Wildlife is used for food, clothing, and fiber. Wildlife is also used for medical purposes and biomedical research. |
| Commercial | Qualities that make wildlife economically valuable. | Commercial markets include meat, fur, leather, parts, and exotic pet trade; often leads to a decline in the species. |
| **Negative Values** | | |
| Accidents | Related to accidents involving wildlife. | Automobile collisions with animals such as deer usually result in the death of the animal and substantial property damage and injury to drivers. |
| Property Damage | Related to crop, livestock, and property damage caused by wildlife. | Birds and mammals cause damage to crops in rural, farm, or developed areas. For example, predators kill livestock and deer eat vegetation and landscaping. |
| Disease Transmission | Related to diseases transmitted to humans. | Wildlife can act as reservoirs for diseases that affect both livestock and humans, such as Lyme disease. |
| Source: Edge, n.d | | |

During the public scoping process for this Plan/EA, a number of people expressed ecological, recreational, and/or aesthetic values related to fisher reintroduction, and a few expressed concerns related to property damage values.

**Ecological -** Numerous comments from the public expressed a desire to enhance the area's ecosystem by restoring fishers, such as: "Bringing fisher back to the Cascades will help restore ecological function to the forests of the region. Fishers are an important predator, and their presence will shape and drive ecosystem and food chain dynamics." However, a few also raised concerns about the impact fishers would have on other species, particularly the pine marten and red fox populations.

**Recreational and Aesthetic -** Many commenters also expressed the importance of fishers from a recreational viewpoint, such as: "Having the opportunity to see this animal from the back of a horse as I have seen most of the other North West wildlife would be a great experience."

**Property -** Some members of the public expressed concern about fishers preying on small domestic animals and pets (this issue is addressed under *Neighboring Landowners, Land Use, and Socioeconomics* in this chapter) and raised concern about the need to enhance food storage practices in the backcountry.

## Impacts of the Alternatives

Past visitor use data, comments from the public, and personal observations of visitation patterns were used to estimate the effects of the alternative actions on visitors to MORA and NOCA.

### Alternative A - No Action Alternative

#### *Direct and Indirect Impacts*

**Visitation Trends.** Because the NPS would not take action to restore fisher to MORA or NOCA and would not be participating in the effort to restore fisher to the SW Cascades, there are no anticipated impacts to visitation at either NOCA or MORA from implementing this alternative, and there would be little to no opportunity to increase the visibility of these two national parks.

**Recreation Resources.** No recreation resources would be impacted in NOCA under Alternative A because fishers would be not reintroduced within the NW Cascades. However, assuming fishers immigrate into MORA from surrounding lands following WDFW's efforts to reintroduce fisher in the SW Cascades, recreation resources in MORA could be adversely impacted if area closures are needed to enable successful establishment of a founding population. As no closures are expected at this time, similar to Alternative B, these adverse impacts are extremely unlikely to occur, but would be negligible and short-term if they did occur.

**Education and Outreach.** Although this alternative would not increase funding for interpretive programs, additional educational and interpretive measures (e.g., brochures and websites) could be developed at MORA, and the implementation of this alternative and the resulting presence of fishers in MORA could focus interpretation efforts on species restoration and forest carnivores, a negligible, but beneficial impact to visitors and other constituents of this park.

Similarly, although the NPS and NPS visitors would not be participating in fisher releases on NPS lands, MORA could seek opportunities to involve citizens in monitoring fishers following WDFW's fisher reintroduction in the SW Cascades. Opportunities could include assisting field crews in locating fishers from the ground, identifying the location of den sites, and conducting follow-up measurements of den site characteristics after females have left the site. These types of activities would provide visitors and local residents an opportunity to directly participate in and learn more about the fisher, resulting in beneficial, short-term (based on the duration of the activity) impacts. Although only a few visitors would be involved in these efforts (in comparison to overall visitation at MORA), given the level of involvement that these opportunities would require and the unique experience they would offer, the intensity of this impact is expected to be minor on overall education and outreach opportunities at MORA.

There would be no impact to education and outreach opportunities in NOCA under this alternative.

**Public Values.** Some visitors and other members of the public, particularly those who value a restored ecosystem, would benefit from the knowledge that an extirpated species was being restored to the SW Cascades. These visitors would experience beneficial, long-term, negligible to minor impacts, depending on their individual beliefs. Other visitors, who value the recreational/aesthetic values of fisher restoration would also experience beneficial, long-term, negligible impacts from an increased (though slight) likelihood of experiencing a rare, forest dwelling species in a national park and wilderness setting. As no restoration would occur in the NW Cascades, these visitors, who know of the fisher's absence and value its restoration, would continue to be negatively impacted by its absence from the ecosystem.

Some people may regard fisher reintroduction as undesirable and associate negative aesthetic, ecological, and recreational values with the program. These visitors would experience adverse, long-term, negligible to minor impacts from reintroduction efforts in the SW Cascades.

#### *Cumulative Impacts*

MORA and NOCA's past, current, and ongoing activities to protect species and their habitat in the SW and NW Cascades, as well as their efforts to provide visitor access, education, and outreach, would beneficially affect park visitors. Ongoing park management and operations activities, including trail maintenance and hazard tree management would be expected to have a combined adverse, short- and long-term, negligible to minor impact on visitor use and experience, as the impact would be barely detectable and/or would affect few visitors. In certain cases, visitors would be aware of the effects

associated with management actions. The overall cumulative result would primarily be beneficial, as any short-term restrictions would give way to long-term preservation of resources and values at both MORA and NOCA. The intensity of these beneficial impacts would range from negligible to minor, depending on an individual's visitation goals, personal values, and exposure to these activities.

#### *Conclusion*

No impacts to visitor use and experience in NOCA would occur under Alternative A as the NPS would not take any management actions to restore fishers to the NW Cascades. Those visitors who are aware of the fishers' absence and would value the addition of this species to the park's ecosystem and wilderness could be adversely affected by the fishers' continued absence, resulting in adverse, long-term, negligible impacts to their recreational experience or social values. Cumulative impacts would be primarily beneficial, long-term, and negligible to minor.

Impacts to recreation resources at MORA would be short-term and negligible. Impacts to education and outreach in MORA would be beneficial, long-term, and negligible to minor; and impacts to public values would be both adverse and beneficial, long-term, and negligible to minor. Overall, cumulative impacts from other park management activities, both adverse (maintenance activities) and beneficial (ecosystem restoration or improvements in visitor services) would combine with fisher restoration activities and would be beneficial and adverse, short- and long-term, and negligible to minor.

### Alternative B — Reintroduce Fishers into MORA and NOCA Using Translocation

#### *Direct and Indirect Impacts*

**Visitation Trends.** No impacts to visitation at either NOCA or MORA are anticipated from this alternative; however, the implementation of this alternative would increase the visibility of these two national parks as press releases are issued and efforts are made to inform and engage the public in reintroduction efforts. This would have a negligible, short-term, beneficial impact on visitor use and experience as impacts would not be measurable or measurable but within the normal range of variability.

**Recreation Resources.** As a state-listed endangered and federal candidate species, fisher reintroductions may require area closures or other short-term constraints on public use near active den sites in order to enable successful release and establishment of a founding population. However, as 1) knowledge of future den sites should be rare, particularly following the initial monitoring period, 2) fishers occur at low densities and are not expected to den in locations of high visitor use (i.e. there are plenty of suitable denning locations), 3) the level of disturbance caused by hikers would likely be small, and 4) closures related to wildlife protection are currently rare at MORA and NOCA, area closures are not anticipated at this time. Even if closures would occur, these would likely align with the denning period which falls during the spring and early summer and would not align with the high visitor use season. Therefore, impacts to recreational access and resources form this alternative, although adverse, would be negligible and short-term.

**Education and Outreach.** Although this alternative would not increase funding for interpretive programs, additional educational and interpretive measures (e.g., brochures and websites) would be developed and the implementation of this alternative and the resulting presence of fishers in MORA and NOCA could focus interpretation efforts on species restoration and forest carnivores, a negligible to minor, but beneficial impact to visitors and other constituents of these parks.

Similarly, the NPS and the WDFW would seek opportunities to involve citizens in reintroduction efforts and monitoring of the fisher reintroduction process. Opportunities would include, but not be limited to, participating in public release of fishers in the parks, assisting staff with monitoring camera stations, deploying and checking hair snare sites, assisting field crews in locating fishers from the ground, identifying the location of den sites, and conducting follow-up measurements of den site characteristics after females have left the site. As the reintroduction program developed, opportunities could be expanded to include working with NPS and WDFW coordinators for outreach and education. These types of activities would provide visitors and local residents an opportunity to directly participate in and learn more about the fisher reintroduction process, resulting in beneficial, short-term (based on the duration of the activity) impacts that would be available throughout the life of the plan. Although only a few visitors would be involved in these efforts (in comparison to overall visitation at MORA and NOCA), given the level of involvement that these opportunities would require and the unique experience they would offer, the intensity of this impact is expected to be minor on overall education and outreach opportunities at both parks.

**Public Values.** Some visitors and other members of the public, particularly those who value a restored ecosystem, would benefit from the knowledge that an extirpated species was being restored to the ecosystems within the SW and NW Cascades. These visitors would experience beneficial, long-term, negligible to minor impacts, depending on their individual beliefs (some visitors would be affected and would be aware of the management actions, resulting in slight but detectable changes in visitor experience). Other visitors, who value the recreational/aesthetic values of fisher restoration would also experience beneficial, long-term, negligible impacts from an increased (though slight) likelihood of experiencing a rare, forest dwelling species in a national park and wilderness setting.

However, some people may regard fisher reintroduction as undesirable, and associate negative aesthetic, ecological, and recreational values with the program. These visitors would experience adverse, long-term, negligible to minor impacts.

#### *Cumulative Impacts*

MORA and NOCA's past, current, and ongoing activities to protect species and their habitat in the SW and NW Cascades, as well as their efforts to provide visitor access, education, and outreach, would beneficially affect park visitors. Ongoing park management and operations activities, including trail maintenance and hazard tree management would be expected to have a combined adverse, short- and long-term, negligible to minor impact on visitor use and experience, as the impact would be barely detectable and/or would affect few visitors. In certain cases, visitors would be aware of the effects associated with management actions. The overall cumulative result would primarily be beneficial, as the short-term restrictions would give way to long-term preservation of resources and values at both MORA and NOCA. The intensity of these beneficial impacts would range from negligible to minor, depending on an individual's visitation goals, personal values, and exposure to these activities.

#### *Conclusion*

Impacts to visitation (beneficial) and recreation resources (adverse) in both MORA and NOCA would be short-term, and negligible. Impacts to education and outreach would be beneficial, long-term, and negligible to minor, and impacts to visitors' social values would be beneficial or adverse, long-term, and negligible to minor. Overall, cumulative impacts from other park management activities, both adverse (maintenance activities) and beneficial (ecosystem restoration or improvements in visitor services) would combine with fisher restoration activities and would be beneficial and adverse, short- and long-term, and negligible to minor.

## NEIGHBORING LANDOWNERS, LAND USE, AND SOCIOECONOMICS

### Issues and Concerns

Impacts to neighboring landowners, land use, and socioeconomics from proposed fisher reintroductions are tied primarily to logging and the timber industry. Under current conditions, private timber lands could be beneficially impacted from fisher predation on mountain beaver and porcupines, which can damage commercial trees and seedlings, but could experience some negative impacts from restrictions on forestry activities to protect this state-listed species. As a state-listed species, it is possible that restrictions could be placed on landowners in order to protect fishers and their habitat, particularly if the land is used for resource extraction, such as timber harvesting. For example, seasonal buffer zones from mechanized activity around known active den sites may be required on neighboring USFS lands to protect fishers. While these restrictions could temporarily impact landowners, the likelihood of a fisher using a forest stand that is subject to harvest is low as fishers are closely associated with late successional forests (which are most commonly found on USFS and NPS lands and are protected from harvest under current conditions).

In addition, fisher biologists and furbearer program managers have documented occurrences of fisher predation on pets and poultry in the Midwest and Northeast, particularly near homes that are in remote settings in forested habitats. While local residents of the SW and NW Cascades could experience fisher predation on small domestic animals and livestock, especially if they are not confined, this is likely to be less common than predation from more common predators (e.g., coyote, bobcats, raccoons).

### Affected Environment

Although lands in the SW and NW Cascades are owned by a complex network of management agencies, Native American reservations, and private landowners, MORA and NOCA are almost entirely surrounded by public lands, most of which are federal lands managed by the USFS and a large percentage of which are designated wilderness – where the provisions of the Wilderness Act prohibit commercial enterprises and permanent roads (see *Figure 1.1: Project Area* on page 4).

According to the Habitat Assessment completed as part of the *Feasibility Assessment for Reintroducing Fishers to Washington*, the Cascade Mountain Range (approximately 12.4 million acres) supports approximately 1.6 million acres of suitable fisher habitat, about 1.1 million acres of which is found on the west side of the Cascade crest and makes up about 17 percent of the western Cascades ecosystem (Lewis and Hayes 2004:22-23) (see

*Table* 3.4: Suitable Fisher Habitat in the Cascades on page 58). Of this suitable habitat, the NPS owns eight percent, the USFS owns 68 percent, tribes own 2.6 percent, and the remaining habitat is owned by the Washington Department of Natural Resources (WDNR) and private landowners (Hayes and Lewis 2006).[6]

#### National Forests

The Mount Baker-Snoqualmie National Forest (over 2.5 million acres) and Okanogan-Wenatchee National Forest (over four million acres) border both parks. The Mount-Baker Snoqualmie National Forest borders MORA to the north and southwest and NOCA to the west and southwest; the Okanogan-Wenatchee National Forest borders MORA to the east and surrounds NOCA to the

[6] These numbers are calculated for suitable habitat in the SW and NW Cascades. The estimates within the Southwestern and Northwestern Reintroduction Areas are slightly different as these areas exclude some suitable habitat in the regions.

southwest, south, and east. The Gifford-Pinchot National Forest (close to 1.4 million acres) also borders MORA to the south. Together, these three national forests protect almost 2.5 million acres of designated wilderness. See *Table 3.9 Designated Wilderness Acreage in USFS Lands Surrounding MORA and NOCA* for a list of these wildernesses and their individual acreages.

**Table 3.9: Designated Wilderness Acreage in USFS Lands Surrounding MORA and NOCA**

| Wilderness in USFS Lands Surrounding MORA and NOCA | Acreage | Wilderness in USFS Lands Surrounding MORA and NOCA | Acreage |
|---|---|---|---|
| Alpine Lakes | 393,416 acres | Mt. Adams | 47,208 acres |
| Boulder River | 49,132 acres | Mt. Baker** | 117,528 acres |
| Clearwater* | 14,598 acres | Noisy-Diobsud** | 14,443 acres |
| Glacier Peak** | 570,973 acres | Norse Peak | 52,315 acres |
| Glacier View* | 3,080 acres | Pasayten** | 531,539 acres |
| Goats Rocks | 105,600 acres | Tatoosh* | 15,700 acres |
| Henry M. Jackson | 103,100 acres | Trapper Creek | 6,050 acres |
| Indian Heaven | 20,782 acres | Wild Sky | 106,577 acres |
| Lake Chelan-Sawtooth** | 153,057 acres | William O. Douglas* | 166,603 acres |
| *Wildernesses that border MORA<br>**Wildernesses that border NOCA | | | |

While commercial activities and permanent roads are prohibited in designated wilderness, the USFS manages timber production and forestry on non-wilderness USFS lands surrounding MORA and NOCA. In 2013, the Okanogan-Wenatchee National Forest completed 16 timber sales in the forest, totaling 3,177 acres and amounting to over $790,000, and the Gifford-Pinchot National Forest completed nine timber sales, totaling 1,608 acres and amounting to over $6.61 million (USFS 2013, USFS n.d.(d)). The Mt. Baker-Snoqualmie National Forest completed no timber sales in 2013, but currently has one sale out for bid, totaling 343 acres (USFS n.d.(a)). The only anticipated timber sale near the park boundaries is the Nisqually Thin EA#1 on the Cowlitz Ranger District, Gifford Pinchot National Forest, totaling 500 acres (USFS n.d.(d)).

Although the USFS manages the lands surrounding NOCA, the wildlife populations within the Mt. Baker-Snoqualmie, Okanogan-Wenatchee, and Gifford-Pinchot National Forests are administered by WDFW (NPS 1995b). The *Northwest Forest Plan* (see *Chapter 1- Introduction* for more details) committed the USFS to a framework and system of standards and guidelines for forest management based on an ecosystem approach to address resource management. These standards and guidelines were apart of the 1994 "Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl". The document specifies that resource management and the quantity of timber offered for sale "will reflect the implications of these standards and guidelines and the land allocations." It presents a combination of land allocations managed primarily to protect and enhance habitat for late-successional and old-growth forest related species and standards and guidelines for the management of the land allocations (REO 2005). For example, to protect federally listed threatened and endangered species, such as the northern spotted owl and the marbled murrelet, ground-disturbing activity (including timber harvests, road construction, and other activities that generate above-ambient noise during the nesting season of federally listed species) in national forests often have area and seasonal operation restrictions to reduce the effects of these activities on listed species. As a result, activities can only occur during certain times of day and year (such as non-nesting periods), so it may take longer to complete some timber harvesting

projects. The continuation of these timing restrictions would most likely continue to affect project implementation, which can reduce the volume of timber harvesting that is carried out on USFS lands (USFS 2006).

### Provincial Parks

British Columbia Parks (BC Parks), under the Ministry of Environment, also protects several provincial parks across the international border from NOCA, in Canada. The Chilliwack Lake, Skagit Valley, and EC Manning Provincial Parks together protect an additional 267,032 acres north of NOCA. These lands are managed for "world class conservation, outdoor recreation, education, and scientific study" (BC Parks Mission Statement).

### State Lands

No state lands border MORA or NOCA. However, major parcels of land owned by the Washington Department of Natural Resources (WDNR) are south and west of MORA's Nisqually entrance, and additional WDNR lands are within in the five counties in which MORA and NOCA are located. These lands are managed for timber harvesting to earn income to help fund local services in many counties and build public schools, universities, state mental hospitals, and other institutions (WDNR 2014b).

In accordance with the Policy for Sustainable Forests (WDNR 2004), WDNR calculates, by county, a sustainable timber harvest that "balances revenue production with ecological values such as healthy forest ecosystem and habitat for threatened and endangered species" (WDNR 2014a). This "sustainable timber harvest" is the volume of timber to be scheduled for sale during a planning decade (WDNR 2014a). In 2013, WDNR publically auctioned 21,720 board feet in Skagit County, 17,870 in Whatcom County, 2,044 in Pierce County, and 50,235 in Lewis County, for a total of 39,590 board feet in areas west and south of NOCA and 52,279 board feet in areas north, west, and south of MORA (WDNR 2014c). See *Table 3.10: 2013 Timber Sales on WDNR Lands in Counties including MORA and NOCA* for the values of these sales of board feet. There were no timber harvests in Chelan County in 2013. WDNR lands within the South Puget Habitat Conservation Plan Planning Unit (which include Pierce and Lewis Counties) are certified as being in compliance with the Forest Stewardship Council (FSC) Pacific Coast Regional Standard.

**Table 3.10: 2013 Timber Sales on WDNR Lands in Counties including MORA and NOCA**

| County | Board Feet | Value |
|---|---|---|
| **MORA** | | |
| Lewis | 50,235 | $14,578,740 |
| Pierce | 2,044 | $459,000 |
| **NOCA** | | |
| Chelan | 0 | 0 |
| Skagit | 21,720 | $5,719,000 |
| Whatcom | 17,870 | $5,259,810 |
| Source: WDNR 2014c | | |

As noted in chapter 1, WDNR has developed a multispecies habitat conservation plan to continue forest management activities on state trust lands (including protection for the private timber companies to whom the state leases land for timber harvest) while complying with the federal Endangered Species Act (WDNR 1997). This habitat conservation plan (described also under "Private Lands" below) defines, among others, mitigation measures to ensure the reproductive success of breeding adult fishers on WDNR-managed forests. This includes restrictions on WDNR contracts for sales of timber and other

valuable materials, as well as grants, rights-of-way, and easements, and the prohibition of activities within 0.5 mile of a known active fisher den site between February 1 and July 31 where such activities would appreciably reduce the likelihood of denning success (WDNR 1997, IV. 169). WDNR-managed roads are also routinely closed for cost-effective forest management and protection of public resources, including wildlife (WDNR 1997).

### Other Government Lands

Seattle City Light (SCL), Seattle's publically-owned electric power utility, operates four hydroelectric dams within NOCA under the Skagit River and Newhalem Creek Hydroelectric Project. As part of these operations, SCL owns a number of acres in the park, not to mention a significant amount of infrastructure on NPS lands, and operates two company towns, Newhalem and Diablo, where a number of Seattle City Light employees live and work.

### Private Lands

MORA is located in Pierce and Lewis Counties, which, as of 2010, have a combined population of 870,680; NOCA is located in Chelan, Skagit, Whatcom Counties which, as of 2010, have a combined population of 390,494 (US Census Bureau 2010). Within these five counties, several small cities, towns, and villages dot the outskirts of each park and are located within the SW and NW Fisher Reintroduction Areas, including Packwood and Randle outside of MORA and Marblemount, Rockport, Concrete, and Darrington outside of NOCA. Chelan County, which includes the small community of Stehekin in Lake Chelan NRA, is located outside of the NW Fisher Reintroduction Area. NOCA includes two inholdings.

Much of the privately held lands near MORA and NOCA, including the private lands in Stehekin, are zoned by the counties within their respective comprehensive plans as rural reserve or rural residential, with densities averaging between one residential unit per five acres to one unit per 20 acres (Skagit County 2007; Whatcom County 2014, Lewis County 2002, Pierce County 2014). Some lands are also open for mineral development near the park boundaries. These designations, and the applicable development regulations and comprehensive plan policies associated with them, help manage growth and maintain the rural character of the communities adjacent to the parks.

Under Washington State's Growth Management Act (GMA), Pierce, Lewis, Skagit, and Whatcom Counties have also zoned a number of private lands around MORA and NOCA for industrial forest practices (Skagit County 2007, Whatcom County 2014, Lewis County 2002, Pierce County 2014), recognizing the importance of these resource lands of long-term commercial significance (WAC 36.70A RCW). Whatcom and Skagit Counties, in particular, have zoned most of the unincorporated, non-public lands near NOCA as Industrial/Commercial Forest lands for the purpose of ensuring that "forest lands of long-term commercial significance are conserved and managed to provide sustainable forest yields, job stability, ecological values and the continuation of a viable commercial forest industry" (Skagit County 2007, Whatcom County 2014).

While no private timber lands border NOCA due to the surrounding USFS lands, Rainier Timber Company, LLC, owns approximately 120,000 acres near MORA and shares approximately six miles of the park's western boundary. Plum Creek Timber Company shares 2.5 miles of the park boundary, with approximately 1,920 acres in four sections adjacent to and near the Carbon River area and one on the western boundary. Timber sales are planned along the Nisqually River and adjacent to the park beginning in 2014-2015. In addition to harvesting activities, Rainier Timber Company's lands are open

for public recreation such as camping, hiking, hunting, and mountain biking, for a fee. Access is by foot, bicycle, or automobile. All-terrain vehicles, horses, motorcycles, and snowmobiles are not allowed.

While the economic health and stability of many Washington counties has long been dependent on the products reaped from forest lands, the amount of forestry employment,[7] as a share of the total employment in each county, has decreased in Pierce, Skagit, and Whatcom Counties since the late 1960s by as much as 63 percent, and today, accounts for two percent or less of total employment in each county. In Lewis County, employment in forestry has increased by 30 percent since 1969, but reached a high of 1,559 jobs in 2002. Since then, this employment sector has decreased by about 14 percent. Today, forestry accounts for almost four percent of Lewis County's approximate 33,500 jobs (BEA n.d.). Similarly, the earnings within forestry and forestry-related industries in Pierce, Skagit, and Whatcom Counties have decreased since 2001 by as much as 21 percent. Earnings from forestry in Lewis County grew by almost six percent since this time. Today, earnings from forestry and forestry related industries accounts for less 2.5 percent of the earnings in Pierce, Skagit, and Whatcom Counties and just over nine percent of the earnings in Lewis County (BEA n.d.).

As noted in chapter 1, the habitat conservation plan developed by WDNR allows private landowners to develop land occupied by listed species under the federal Endangered Species Act provided that they undertake conservation measures. The "No Surprises Policy" assures participating landowners that they would incur no additional mitigation requirements beyond those they agreed to in their habitat conservation plans, even if circumstances change or additional species are subsequently listed (USFWS n.d.a). Habitat conservation plans can include conservation measures for candidate species, proposed species, and other species of concern at the time a plan is developed, and the fisher is covered under WDNR's plan (WDNR 1997; Lewis and Hayes 2004). The combination of conservation strategies included in the WDNR habitat conservation plan is expected to provide forest conditions suitable for fisher breeding, foraging, and resting habitat by ensuring the development of large landscapes of mature and old-growth forest. To meet the plan's objective of providing habitat to support fishers, additional mitigation was necessary to ensure the reproductive success of breeding adults in WDNR-managed forests. In particular, special management was identified to minimize human disturbance around active den sites and to eliminate trapping mortality. This includes restrictions placed by the department on its contracts for the sale of timber and other valuable materials, as well as in its grants and rights-of-way and easements, to prohibit activities within 0.5 mile of a known active fisher den site between February 1 and July 31 where such activities would appreciably reduce the likelihood of denning success (WDNR 1997, IV. 169).

### Tribal Lands

There are no tribal lands located within the Southwestern Fisher Reintroduction Area. However, the Yakama Reservation is immediately to the east of the Southwestern Fisher Reintroduction Area and includes suitable fisher habitat.

There is one reservation in the Northwestern Fisher Reintroduction Area, belonging to the Sauk-Suiattle Indian Tribe. Current membership of this tribe numbers around 200 individuals (Sauk-Suiattle Indian Tribe 2007).

[7] Data from 1969-2000 is based on the U.S. Standard Industrial Classification system which groups agricultural services with fishing and forestry. Since 2000, the employment numbers are based on the North American Industry Classification System which groups only forestry, fishing, and related activities.

### Fisher Predation on Domestic Animals

Fisher biologists and furbearer program managers have documented fisher predation on pets and small livestock in the Midwest and Northeast. These events typically occur where homes are in remote, forested habitats. In these situations, fishers might prey on feral cats or house cats that spend time outdoors. Small dogs may also be vulnerable, but less so than cats. Fishers may also prey on small livestock, such as chickens, ducks, geese, and rabbits that range outside a predator-proof coop or barn. In Wisconsin, where fisher densities are extremely high (one fisher per two square miles), approximately ten damage reports per year are attributed to fishers. While some of these problems are actually caused by fishers, some are likely to have other causes. Biologists and managers indicate that while fishers may opportunistically prey on pets (especially cats) and small livestock, these events are uncommon because fishers tend to avoid people and developed areas, even when their numbers are high (Lewis, pers. comm., 2006).

Farm earnings for the four counties that could be most affected by this plan include earnings related to both livestock and crops. Farm earnings for 2012 for these counties comprised less than one percent of total earnings in Pierce and Lewis Counties and less than 2.5 percent in Skagit and Whatcom Counties (BEA n.d.). Fishers would not impact crops; therefore, the amount of livestock represented by these figures would likely be lower, particularly since only small livestock would be affected.

Predation by other predators, such as mountain lions and coyotes, on pets and small livestock has occurred in the past on the NW and SW Cascades. For example, in 2011, a cougar attacked livestock near Sedro-Woolley in Skagit County (The Herald of Everett 2012).

## Impacts of the Alternatives

### Alternative A - No Action Alternative

#### *Direct and Indirect Impacts*

There would be no impacts to neighboring landowners, land use, or socioeconomics in the NW Cascades from Alternative A as no fisher would be reintroduced in the region.

However, impacts to neighboring landowners, land use, and socioeconomics in the SW Cascades would be similar to those from Alternative B as fishers are anticipated to be present in MORA and the surrounding lands under this alternative. Considering the potential need to place restrictions around fisher dens, particularly on USFS lands which contain the most suitable fisher habitat, neighboring land owners could individually experience long term, adverse, negligible to moderate impacts from WDFW actions to restore fisher in the SW Cascades under this alternative, and other neighbors with domestic animals or livestock could experience negligible adverse impacts from potential fisher predation. That said, lands managed for forestry in the SW and NW Cascades could also experience long-term, beneficial, negligible impacts to land use and socioeconomics from fisher restoration due to fisher predation on other mammals that can decrease the productivity of forestry lands. See impacts to Alternative B for more discussion.

#### *Cumulative Impacts*

A large percentage of USFS lands would continue to be protected as designated wilderness under the Wilderness Act which prohibits commercial timber production and harvesting on these lands. On non-wilderness federal and state lands, the USFS and WDFW would continue to complete timber sales which would bring in income for each agency (a minor beneficial impact), and implementation of the Northwest Forest Plan and multispecies habitat conservation plan would continue to have adverse,

minor to moderate impacts on timber operations on respective USFS and WDNR lands for the protection of state and federally listed species. Local county zoning regulations would continue to apply to Pierce, Lewis, Skagit, Whatcom, and Chelan Counties which would have long-term, minor, beneficial impacts in helping to manage growth and maintain the rural character of the communities adjacent to the parks.

#### *Conclusion*

There would be no adverse impacts to neighboring landowners, land use, and socioeconomics in the NW Cascades. Cumulative impacts would be adverse and minor to moderate.

Neighboring landowners, land use, and socioeconomics could individually experience long-term, negligible to moderate, adverse impacts and long-term, negligible, beneficial impacts from fisher reintroduction in the SW Cascades. Adverse cumulative impacts would be minor to moderate in this region while beneficial impacts would be minor.

### Alternative B - No Action Alternative

#### *Direct and Indirect Impacts*

Neighboring landowners (including the land use on their property and the earnings derived from the property) could individually experience long-term, negligible to moderate, adverse impacts and long-term, negligible, beneficial impacts from fisher restoration in the NW and SW Cascades.

The USFS, which manages the majority (68 percent) of suitable fisher habitat in the SW and NW Cascades and contains all non-NPS candidate release sites under this alternative, would be the most likely neighboring landowner to be impacted by fisher restoration because USFS lands would be the most likely to contain this state-listed species. Under their own management guidance, the USFS treats federal candidate and state listed species, such as the fisher, as "sensitive", whose management "must not result in a loss of species viability or create significant trends toward federal listing" (FSM 2670.32). Given that fishers would likely inhabit USFS lands under this alternative, the USFS may apply seasonal restrictions on certain activities that have the potential to adversely impact fisher. Such restrictions would likely be placed only in close proximity to known, active fisher denning sites and would likely be tied to fisher denning periods (early March through the end of July). While these restrictions could delay activities such as timber harvesting and associated activities (e.g. felling, yarding, and road building), the potential for and impact from any restriction would be largely reduced by fisher behavior and limited monitoring. Female fishers may move kits during the denning season, reducing the length of time seasonal restrictions would be needed in any one location, and do not use the same den site in consecutive years, reducing the potential to impact the same stand for multiple years in a row. Similarly, once the individual tracking device on a fisher fails (VHF radio-transmitters are projected to last approximately two years after the release), locations of denning fishers would generally be unknown, and the USFS would therefore be unlikely to place any seasonal restrictions tied to such activity on their land. During and following the fisher reintroduction on the Olympic Peninsula, the USFS did not implement any restrictions on forestry activities, furthermore confirming the unlikelihood of this occurring (Happe, pers. comm., 2014b). Based on the above discussion, forestry activities on USFS lands could be adversely impacted long-term (i.e. so long as fisher are present and listed) by successful fisher restoration; however, any impacts to specific areas and individual landowners would be unlikely and negligible to moderate if they occurred, depending on the precise location of the known den and plans for timber harvesting in that location at the time.

WNDR and private lands account for more than 21 percent of suitable fisher habitat in the SW and NW Cascades. However, because there is no critical habitat rule (WAC 222-16-080) for the fisher under the State Forest Practices Act (RCW 76.09), there are currently no mandatory restrictions on forest practice activities to protect fisher habitat on state or private timberlands (Lewis and Hayes 2004) and forestry activities on WDNR and private lands would not likely be impacted by fisher restoration in the SW and NW Cascades. That said, private land owners are prohibited from hunting/trapping, possessing, or harming a state endangered species, and knowingly cutting down or disturbing an occupied fisher den tree would be a violation of state law. Therefore, if a landowner knew of an existing den site, they may experience adverse impacts from delayed harvesting activities out of protection for a den site. While this impact would likely be perceived by the individual as minor to moderate, the potential for this impact to occur is minimized by the lack of monitoring after two years following release (see discussion on USFS above) and the limited high quality fisher habitat on private lands surrounding the parks. Therefore, adverse impacts to forestry activities on WDNR and private lands from this alternative could be long-term and negligible to moderate under existing conditions.

Is it important to note that if the fisher population in the state of Washington recovered to the point that it met the state recovery objectives (Hayes and Lewis 2006), as is intended under this alternative, the Washington Fish and Wildlife Commission could delist the species to state sensitive status and manage the species as protected wildlife (WAC § 232-12-011). While this would be a step in the recovery process for the fisher, regardless of its federal conservation status, this down-listing would not substantially change the impacts neighboring landowners, landuse, or socioeconomics discussed above as 1) the species would still be at least a federal candidate species, meaning the USFS would still manage the fisher as "sensitive", and 2) the current state-listing already does not place any restrictions on forest practice activities to protect fisher habitat on state or private timberlands. Similarly, regardless of the fisher's listing, the USFS and WDNR would likely continue to protect and enhance suitable fisher habitat through forestry practices outlined in their respective Northwest Forest Plan and multispecies habitat conservation plan, such as thinning to promote the future development of late-successional habitat for species such as northern spotted owl and marbled murrelet and prohibiting activities within 0.5 mile of a known active fisher den site between February 1 and July 31 (WDNR 1997).

Regardless of landowner, lands managed for forestry in the SW and NW Cascades could also experience long-term, beneficial impacts to land use and socioeconomics from fisher restoration due to fisher predation on other mammals that can decrease the productivity of forestry lands, such as the mountain beaver and porcupine. Following the reduction of fisher populations on much of the forested lands in the U.S., porcupine populations climbed to extremely high densities and were blamed for much timber damage (Powell and Zielinski 1994). Although it is difficult to quantify the damage caused by porcupines because they also beneficially prune trees, damage did occur in areas with very high porcupine populations (Powell and Zielinski 1994). Because the fisher is one of the only species that preys on porcupines, many states and provinces reintroduced fishers in the late 1950s and 1960s to reduce high porcupine population densities, as well as reestablish a native mammal (Powell and Zielinski 1994). Specifically, logging companies reintroduced fishers into northern New England in the 1950s to control porcupines which were decimating seedlings that had been planted by the timber companies for reestablishing trees in logged areas. Given the current absence of this native predator-prey relationship, the restoration of fishers in the SW and NW Cascades may have a beneficial, long-term economic impact on timber harvesting. However, due to the anticipated low densities at which fisher are expected to occur in the Cascades and the unknown damage that these other mammals have

on forest lands in the SW and NW Cascades, these beneficial impacts from fisher restoration would likely be only negligible.

The reintroduction of fishers at MORA and NOCA might also result in long-term, adverse impacts to local domestic and farm animals such as house cats, rabbits, poultry, and small mammals on adjacent lands. However, these events are uncommon, even where fishers are abundant, because fishers tend to avoid people and developed areas. Similarly, considering that pet and small livestock owners who may be susceptible to loss of animals from fisher predation already need to protect their pets and small livestock from more common predators that occur at higher densities such as coyote, raccoon, skunks, bobcats, and weasels, the addition of fishers to the SW and NW Cascades regions would not cause any changes to management and animal husbandry. Although individual prey animals could suffer injury or fatality, the overall adverse impact on the pets and livestock would be negligible given the anticipated low densities at which fisher are expected to occur in the Cascades and the presence of more common predators.

#### *Cumulative Impacts*

A large percentage of USFS lands would continue to be protected as designated wilderness under the Wilderness Act which prohibits commercial timber production and harvesting on these lands. On non-wilderness federal and state lands, the USFS and WDFW would continue to complete timber sales which would bring in income for each agency, and implementation of the Northwest Forest Plan and multispecies habitat conservation plan would continue to have adverse, minor to moderate impacts on timber operations on respective USFS and WDNR lands for the protection of state and federally listed species. Local county zoning regulations would continue to apply to Pierce, Lewis, Skagit, Whatcom, and Chelan Counties which would have long-term beneficial impacts in helping to manage growth and maintain the rural character of the communities adjacent to the parks.

#### *Conclusion*

Although rare and unlikely, neighboring landowners could individually experience long-term, negligible to moderate, adverse impacts and long-term, negligible, beneficial impacts from fisher reintroduction in the SW and NW Cascades. Adverse cumulative impacts would be minor to moderate in these regions while beneficial impacts would be minor.

## PARK MANAGEMENT AND OPERATIONS

### Issues and Concerns

Restoration of fisher on NPS lands would require funding and personnel to implement initial restoration actions and conduct associated monitoring programs. These actions would impose an operational and financial burden on the parks and could require diversion of resources away from other priorities due to current and projected budgetary shortfalls in the agency.

### Affected Environment

Both MORA and NOCA operate wildlife programs within their respective Division of Natural and Cultural Resources which are each led by a division chief that is overseen directly by the park's superintendent (NOCA) or deputy superintendent (MORA). Both programs were, until recently, managed by career-seasonal wildlife biologists (i.e. positions that are permanent but subject to furlough; the wildlife biologist at NOCA is guaranteed only 9.25 months of work each year) who implemented inventory and monitoring work associated with the North Coast and Cascadia Network of the NPS and completed park-specific work such as short-term research studies and compliance surveys for park

proposed projects. Both lead biologists have retired in the last year and a half, and NOCA has hired the position which should be filled in October 2014. It is unknown at this time if MORA will fill the position as it has existed in the past.

Depending on funding, both wildlife programs have also been supported by a number of permanent, term, and/or seasonal staff over the years. In addition to the park's lead wildlife biologist, NOCA employs another career seasonal wildlife biologist who is primarily responsible for field work – monitoring primarily large carnivores and threatened and endangered species in the park, and a number of seasonal staff who assist with other inventory and monitoring work. MORA has also employed a couple of term biotechs in the last five years and a number of seasonal staff who have assisted with monitoring species of interest in the park such as marmots, bats, and spotted owls.

## Impacts of the Alternatives

### Alternative A - No Action Alternative

#### *Direct and Indirect Impacts*

Because the NPS would not be involved in any reintroduction efforts, there would be no impact to NPS staff or budgets from implementing this alternative. However, if fishers recolonize MORA during WDFW reintroduction efforts, MORA would assist WDFW as resources permit to support recovery. According to *NPS Management Policies*, MORA would also continue to protect the fisher and fisher habitat as it does for several species that share habitat with the fisher, such as the spotted owl. Therefore, this alternative could have a negligible, short-term and long-term, adverse effects on park operations at MORA as it might require staff time to assistant with WDFW efforts during and immediately following reintroductions and as more oversight may be required with planning projects within the park in order to ensure the protection of fisher and fisher habitat in to the future. There would be no impact to NOCA from this alternative beyond existing conditions.

#### *Cumulative Impacts*

Other impacts on operations include implementation of other plans, such as the Nisqually-Paradise Road Rehabilititation in MORA and the Stehekin River Corridor Implementation Plan in NOCA. Potential future budgetary restrictions could also impact the ability to effectively manage wildlife, including state and federally listed species, within and adjacent to both parks.

#### *Conclusion*

This alternative would not impact NOCA; however impacts to MORA would likely be short- to long-term, adverse, and negligible.

### Alternative B — Reintroduce Fishers into MORA and NOCA Using Translocation

#### *Direct and Indirect Impacts*

While fisher restoration is estimated to cost a total of $1.1 million for both the SW and NW Cascades, the NPS would not be responsible for the full cost of implementation, which is expected to be shared with WDFW and other interested parties. As of fall 2014, the NPS has identified $470,992 from national funds (non-park base) that could be made available for the project as early as FY2016 (October 1, 2015), and a number of other sources of funding have been identified. In addition to funding, restoration of fisher on NPS lands would require personnel to implement initial restoration actions and conduct associated monitoring programs. Specifically, this alternative would necessitate the involvement of all park wildlife biologists, as well as support from the management team and interpretation staff, for the

implementation of fisher restoration. Wildlife biologists would be responsible for helping to obtain additional funding for the reintroductions; organizing releases of fisher; implementing the monitoring program within the parks such as monitoring camera stations, deploying and checking hair snare sites, locating fishers from the ground and from the air, and identifying the location of den sites; and completing reports based on monitoring data. Interpretation staff would be responsible for issuing press releases for fisher releases in the parks and implementing any changes within interpretive programing to highlight species reintroductions and/or forest carnivores; and volunteer coordinators at both parks would be needed to organize volunteer involvement in the reintroductions and monitoring. These actions, which would certainly be supported by other staff within the parks, would impose a short-term operational and financial burden on the parks and could require diversion of resources (particularly staff time) away from other priorities due to current and projected budgetary shortfalls in the agency. Considering the leadership (and financial and administrative support) of WDFW within this reintroduction effort and the allocation of NPS project-funding toward this project (as previously mention, a substantial amount of the funding has already been identified at the national, not park, level), these commitments would have a minor, short- to long-term, adverse impact to park management and operations. Additional oversight may also be required for future NPS planning projects in order to ensure the protection of fisher and fisher habitat which would have an adverse, long-term, negligible impact on park management and operations as oversight is already given to species with similar habitat requirements.

#### *Cumulative Impacts*

Other impacts on operations include implementation of other plans, such as the Nisqually-Paradise Road Rehabilitation in MORA and the Stehekin River Corridor Implementation Plan in NOCA. Potential future budgetary restrictions could also impact the ability to effectively manage wildlife, including state and federally listed species, within and adjacent to both parks.

#### *Conclusion*

This alternative would have negligible to minor, short- to long-term, adverse impacts on park management and operations at both MORA and NOCA.

# Chapter 4 - Consultation and Coordination

## HISTORY OF PUBLIC INVOLVEMENT

The formal public scoping period for the Fisher Restoration Plan / Environmental Assessment (EA) began on August 15, 2013 and extended through September 30, 2013.

The NPS announced the public scoping period and invited public comment through press releases, websites, mailings, and information distributed at park visitor centers and the Puyallup Fair. A press release was distributed to local and regional news media on August 15th, at least eight of whom carried the story, including The Seattle News Tribune, The Seattle Times, The Columbian, The Herald (out of Everett, WA), The Bonney Lake Sumner Courier – Herald, The Seattle Weekly, The Olympian, and The Centralia Chronicle. A few organizations also posted information about the proposed plan on their websites, including North Cascades Institute, National Parks Conservation Association, Northwest Hiker, Washington Trails Association, and Wilderness Watch. Information about the planning effort was posted on Mount Rainier National Park's and North Cascades National Park Complex's NPS official websites, and a project-specific public website (http://parkplanning.nps.gov/RestoreFisher) was created through the NPS Planning, Environment, and Public Comment (PEPC) website to provide documents and information about the planning effort. This website also included a venue to accept public comments. NPS staff produced and mailed/emailed a one-page, double-sided newsletter to approximately 1,100 individuals, agencies, organizations, governmental representatives, and tribal governments. In addition to the mailing, this newsletter was distributed at park visitor centers and at the Mount Rainier National Park's booth at the Puyallup Fair throughout the month of September.

Throughout the public scoping period, the public was invited to submit comments by regular mail or online on the project website on PEPC.

During the public scoping period, the NPS received correspondence from approximately 525 individuals, agencies, and organizations. While a number of these correspondences were submitted via mail or online (~40), the majority of correspondences, including a form letter signed by 393 individuals, were submitted via the National Parks Conservation Association (NPCA) who collected comment letters from their members, compiled these electronically, and mailed the NPS a CD containing all correspondences.

Following the public scoping period, Mason Reid, wildlife ecologist at MORA and project lead for this Plan/EA, hosted a facebook chat on the proposed fisher reintroduction on March 27, 2014 from 3:00-4:00pm. At least eleven people participated in this conversation – asking questions about the fisher and its diet and reproductive behaviors, competition with other predators, other reintroduction efforts, and information about the proposed reintroduction in MORA.

## AGENCIES AND TRIBES CONSULTED

### U.S. Fish and Wildlife Service

The Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) requires all federal agencies to consult with the USFWS to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. The NPS began informal consultation on this project with the USFWS on June 24, 2013. During an informal consultation meeting, the NPS obtained a list of federally listed endangered and threatened species that may be present in the project area and affected by the proposed action from the USFWS. The list was used as

the basis for the special status species analysis in this EA and the *Biological Assessment* (BA) prepared for the proposed action (included in Appendix A). Based on the analysis in this EA and BA, the National Park Service has determined that the proposed action is not likely to adversely affect federally listed species or critical habitat within the project areas. The *Biological Assessment* prepared for this Plan/EA was submitted to USFWS on September 15, 2014 with a request for their review and concurrence with this determination.

### Washington State Historic Preservation Office

Consultation with the State Historic Preservation Officer (SHPO) and tribes was initiated on August 15, 2013, with a letter a scoping newsletter distributed to the SHPO and tribes affiliated with MORA and NOCA. MORA also held an annual meeting with tribes in June 2013 and discussed this Plan/EA and proposed actions at that time. The NPS has not received any comments on the proposed action from these parties.

## LIST OF RECIPIENTS

| | |
|---|---|
| British Columbia Aboriginal Fisheries Commission | Okanogan-Wenatchee National Forest |
| British Columbia Parks, Ministry of Environment | Olympic National Forest |
| Bureau of Indian Affairs - Portland Office | Olympic National Park |
| Bureau of Land Management | Port Commissioner |
| Burlington Parks & Recreation | Port of Chelan County |
| Chelan County Board of Commissioners | Puyallup Tribe of Indians |
| Chelan County Department of Natural Resources | Samish Tribal Nation |
| Chelan County Noxious Weed Board | San Juan National Historical Park |
| Chelan County Planning | Sauk-Suiattle Indian Tribe |
| Chelan County PUD | Seattle City Light |
| Chelan County Sheriff's Office | Seattle District Corps of Engineers, South Puget Sound Section |
| Chelan Ranger District | Seattle Office of Sustainability & Envir |
| City of Anacortes | Skagit County Noxious Weed Control Board |
| City of Bellingham | Skagit County Parks & Recreation |
| City of Burlington | Skagit County Public Works Dept |
| City of Chelan | Skagit County Sheriff's Office |
| City of Concrete | Skagit County Upriver Services |
| City of Ferndale | Skagit Environmental Endowment Commission |
| City of Mount Vernon | Skagit Watershed Council |
| City of Sedro-Woolley | Squaxin Island Tribe |
| City of Winthrop | University of Idaho, Dept of Forest Resources |
| Colville Confederated Tribes | Upper Skagit Indian Tribe |
| Colville National Forest | US Army Corps of Engineers |
| Confederated Tribes and Bands of the Yakama Nation | US Department of Justice |
| Cowlitz Indian Tribe | US DOT, Fed. Hwy Administration |
| Darrington Ranger District | US Fish and Wildlife Service - Western WA |
| Ebey's Landing National Historical Reserve | US Forest Service - Pacific Wildland Fire Sciences Laboratory |
| Environmental Protection Agency, Region 10 | USGS BRD Western Fisheries Research Center |
| Federal Energy Regulatory Commission, Portland Office | USGS Forest & Rangeland Ecosystem Science Center |

| | |
|---|---|
| Fort Vancouver National Historic Site | Washington Dept. of Archeology and Historic Preservation |
| Gifford Pinchot National Forest | Washington State Department of Agriculture |
| Klondike Gold Rush National Historic Park | Washington State Department of Ecology |
| Mount Baker-Snoqualmie National Forest | Washington State Department of Fish and Wildlife |
| Muckleshoot Indian Tribal Council | Washington State Department of Fisheries, Ms/Ax-11 |
| National Marine Fisheries Service | Washington State Department of Natural Resources |
| National Park Service - Fort Collins | Washington State Department of Tourism |
| National Park Service – Water Resources Division | Washington State Department of Transportation |
| National Park Service – Environmental Quality Division | Washington State Interagency Committee for Outdoor Recreation |
| Nisqually Indian Tribe | Washington State Noxious Weed Control Board |
| Nlaka'pamux Nation | Washington State Parks |
| NOAA Fisheries, Washington Habitat Branch | Washington State Parks & Recreation Commission |
| Nooksack Indian Tribal Council | Washington State Recreation and Conservation Office |
| NPS, Natural Resource Stewardship & Science | Washington State Seaplane Pilots Association |
| NPS, Pacific West Region Office - Seattle | Washington Utilities & Transport Commission |
| NPS, DSC Technical Information Center | Whatcom County Council |
| Office of Federal Programs | Whatcom County Noxious Weed Control Board |
| Office of the Governor | Whatcom County Parks |
| Office of the Regional Solicitor | Whatcom County Planning/Dev. Services |
| Okanogan County Noxious Weed Control Board | WSU Mt. Vernon Research & Extension Unit |

## LIST OF PREPARERS

The following NPS and WDFW staff helped to prepare and review this document.

| Name | Position | Responsibility |
|---|---|---|
| NOCA | | |
| Karen Taylor-Goodrich | Superintendent | Decision Maker |
| Jack Oelfke | Chief, Natural and Cultural Resources | Project Advisor |
| Denise Schultz | Chief of Interpretation and Education | Project Advisor and Public Information Officer |
| Bob Kuntz | Wildlife Biologist, Retired | Project Lead (initial) |
| Jason Ransom | Wildlife Biologist, beginning October 2014 | Project Advisor |
| Roger Christophersen | Wildlife Biologist | Project Advisor |
| Roy Zipp | Environmental Protection Specialist | NEPA Advisor |
| Jesse Kennedy | Cultural Resources Manager, Retired | NHPA Advisor |
| Kim Kwarsick | Cultural Resources Manager | NHPA Advisor |
| Elly (Elizabeth) Boerke | Environmental Protection Specialist | NEPA Lead |
| Kelly Bush | Wilderness District Ranger, Retired | Wilderness Advisor |
| Ken Hires | Stehekin District Interpreter | Public Information Officer |
| MORA | | |
| Randy King | Superintendent | Decision Maker |
| Tracy Swartout | Deputy Superintendent | Project Advisor |
| Roger Andrascik | Chief, Natural and Cultural Resources | Project Advisor |
| Mason Reid | Wildlife Ecologist/Project Manager, Retired | Project Lead |
| Barbara Samora | Aquatics Program Manager/Biologist | Project Advisor |

| Name | Position | Responsibility |
|---|---|---|
| Karen Thompson | Environmental Protection Specialist | NEPA Advisor |
| Ben Diaz | Section 106 Coordinator | Technical Specialist |
| Greg Burtchard | Cultural Resources Manager | NHPA Advisor |
| Kraig Snure | Wilderness District Ranger | Wilderness Advisor |
| Ingrid Nixon | Chief, Interpretation and Education | Project Advisor and Public Information Officer |
| Washington Department of Fish and Wildlife | | |
| Jeff Lewis | Mesocarnivore Conservation Biologist | Project Advisor (Primary) |
| Harriet Allen | Endangered & Threatened Species Section Manager, Retired | Project Advisor |

# Glossary

**Augmentation**: An augmentation is an attempt to add individuals to an existing population (IUCN 1987, Nielsen 1988).

**Candidate Species:** "those species for which the Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list [as endangered or threatened] but issuance of the proposed rule is precluded". Source: www.fws.gov/Midwest/Endangered/glossary/index.html

**Endangered Species:** a plant or animal "in danger of extinction within the foreseeable future throughout all or a significance portion of its range". Source: www.fws.gov/Midwest/Endangered/glossary/index.html

**Introduction:** An introduction is an attempt to establish a population outside its historical range.

**Reintroduction:** A reintroduction is an attempt to reestablish a population where it no longer exists within its historical range.

**Threatened Species:** "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range". Source: www.fws.gov/Midwest/Endangered/glossary/index.html

**Translocation:** A translocation is the intentional release of animals in the wild to reestablish, augment, or establish a population (Griffith et al. 1989). Translocations include reintroductions, introductions and augmentations.

# Acronyms

| | |
|---|---|
| AGL | Above ground level |
| BA | Biological Assessment |
| BCFLNRO | British Columbia Ministry of Forests, Lands, and Natural Resource Operations |
| BCMOE | British Columbia Ministry of Environment |
| BLM | Bureau of Land Management |
| CEQ | Council of Environmental Quality |
| DPS | Distinct Population Segment |
| EA | Environmental Assessment |
| ELC | Environmental Learning Center |
| FFA | Federal Aviation Administration |
| GMA | Growth Management Act |
| IPCC | Intergovernmental Panel on Climate Change |
| MORA | Mount Rainier National Park |
| NOCA | North Cascades National Park Service Complex (includes North Cascades National Park and Ross Lake and Lake Chelan National Recreation Areas) |
| NPS | National Park Service |
| NRA | National Recreation Area |
| NW | Northwest |
| OLYM | Olympic National Park |
| PEPC | Planning, Environment, and Public Comment |
| PILT | Payment in Lieu of Taxes |
| RNA | Research Natural Area |
| SCL | Seattle City Light |
| SW | Southwest |
| WDOA | Washington Department of Agriculture |
| WDFW | Washington Department of Fish and Wildlife |
| WDNR | Washington Department of Natural Resources |
| U.S. | United States |
| USFWS | United States Fish and Wildlife Service |
| USFS | United States Forest Service |

# Bibliography


**ABR, Inc.**

2005 Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

2008 Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

2009 Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

**Alexander, S. M. and N. M. Waters**

2000. The effects of highway transportation corridors on wildlife: a case study of Banff National Park. Transportation Research Part C 8:307-320.

**Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.B. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.B. Gerhardt, S.A. Gremel, R.J. Gutierrez, P. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern**

2006 Status and trends in demography of northern spotted owls, 1985-2003. Wildlife Monographs 163.

**Arthur, S.M. and W.B. Krohn**

1991 "Activity Patterns, Movements, and Reproductive Ecology of Fishers in South-central Maine." Journal of Mammalogy 72:379-85.

**Aubry, K.B.**

1983 The Cascade red fox—Distribution, morphology, zoogeography and ecology. Seattle, University of Washington, Ph.D. dissertation.

1984 The recent history and present distribution of the red fox in Washington. Northwest Science, 58:69–79.

**Aubry, K.B. and D.B. Houston**

1992 "Distribution and status of the fisher (Martes pennanti) in Washington." Northwest Naturalist. 73:69-79.

**Aubry, K. B, and J. C. Lewis**

2003 Extirpation and reintroduction of fishers (Martes pennanti) in Oregon: implications for their conservation in the Pacific states. Biological Conservation 114:79-90.

**Aubry, K. B., K. S. McKelvey, and J. P. Copeland**

2007 Distribution and Broadscale Habitat Relations of the Wolverine in the Contiguous United States. Journal of Wildlife Management. Vol. 71. pp. 2147-2158.

**Aubrey, K.B., and C.M. Raley**

2002 "Ecological Characteristics of Fishers in the Southern Oregon Cascade Range. Final Progress Report." U.S. Forest Service, Pacific Northwest Research Station, Olympia, Washington. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington. Washington Department of Fish and Wildlife, Olympia, WA.

2006 "Ecological characteristics of fishers (Martes pennanti) in the southern Oregon Cascade Range. Update: July 2006." USDA Forest Service, Pacific Northwest Research Station, Olympia, WA. 30 pp.

**Aubry, K.B., C.M. Raley, S.W. Buskirk, W.J. Zielinski, M.K. Schwartz, R.T. Golightly, K.L. Purcell, R.D. Weir, J.S. Yaeger**

2013 Meta-analyses of habitat selection by fishers at resting sites in the Pacific coastal region. Journal of Wildlife Management 77(5):965–974.

**Aubry, K. B., J. Rohrer, C. M. Raley, R.D. Weir, and S. Fitkin**

2012 Wolverine distribution and ecology in the North Cascades Ecosystem; 2012 annual report. 44 pp.

**Aubry, K.B., M.J. Statham, B.N. Sacks, J.D. Perrine, and S.M. Wisely**

2009 Phylogeography of the North American red fox: vicariance in Pleistocene forest refugia. Molecular Ecology, 18:2668–2686.

**Bagnall, K.E.**
2012 Spotted owl monitoring in Mount Rainier National Park. 2012 Annual Report. Unpublished report, Mount Rainier National Park, Longmire, WA. 11pp.

**Bagnall, K.E.**
2013 Spotted owl monitoring in Mount Rainier National Park. 2013 Annual Report. Unpublished report, Mount Rainier National Park, Longmire, WA. 11pp.

**Banci, V.**
1994 Wolverine. Pages 99-127 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, editors. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the western United States. U.S. Forest Service General Technical Report RM-254.

**Bartels, P.**
2000 Western gray squirrel nest survey Chelan and Okanogan Counties, Washington. Unpublished report. Washington Department of Fish and Wildlife, Region 2. Ephrata, Washington. 28p.

**Berg, W.E.**
1982 "Reintroduction of Fisher, Pine Marten and River Otter." In Midwest Furbearer Management, edited by G.C. Sanderson, 159–75. North Central Section of The Wildlife Society, Bloomington, IL.

**Berglund, B., T. Lindvall, D.H. Schwela**
1999 Guidelines for community noise. World Health Organization, Occupational and Environmental Health Team. London, United Kingdom.

**Bureau of Economic Analysis (BEA)**
n.d. Regional Economic Accounts. U.S. Department of Commerce. Available at http://www.bea.gov/regional/index.htm. Accessed on July 7, 2014.

**Biek, D.**
2000 Flora of Mount Rainier National Park. Oregon State University Press, Corvallis, OR. 506 p.

**Bloxton, T.D.**
2002 Prey Abundance, Space Use, Demography, and Foraging Habitat of Northern Goshawks in Western Washington. M.S. Thesis, Univ. of Wash, Seattle.

**Bolsinger, C.L. and K.L. Waddell**
1993 Area of Old-Growth Forests in California, Oregon, and Washington. United States Department of Agriculture. Forest Service. Pacific Northwest Research Station. Resource Bulletin PNW-RB-197. Portland, OR.

**Bowerman, W.W., T. Dolittle, T. Erdman, and S. Potupalsky**
2000 1999 Field season results for Wisconsin and Michigan: comments on factors controlling goshawk populations. Unpublished report.

**Braaten, A.**
2014 Personal Communication. Email from A. Braaten to E. Boerke regarding area closures for wildlife. May 7, 2014.

**Breitenmoser, U.C., Breitenmoser-Wursten, L.W. Carbyn, and S.M. Funk**
2001 "Assessment of Carnivore Reintroductions." In Carnivore Conservation, edited by J. L. Gittleman, S. M. Funk, D. W. Macdonald, and R. K. Wayne, 240–81. New York: Cambridge University Press.

**Brown. A.**
2014 Personal Communication. Email from A. Brown to E. Boerke regarding Volunteer and Youth Programs. May 12, 2014.

**Buck, S.G., C. Mullis, and A. Mossman**
1983 "Corral-Bottom/Hayfork Bally Fisher Study." USDA Forest Service and Humboldt State University, Arcata, California. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington. Washington Department of Fish and Wildlife, Olympia, WA.

**Bull, Evelyn L. and Jerome A. Jackson.**
2011 Pileated Woodpecker (Dryocopus pileatus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/148 doi:10.2173/bna.148

**Burns, C.E., K.M. Johnston, and O.J. Schmitz**
2013 "Global Climate Change and Mammalian Species Diversity in U.S. National Parks". Proceedings of the National Academy of Sciences of the United States of America. 100, 20: 11474-11477. National Academy of Sciences.

**Bush, K.**
2014 Personal Communication. Email from K. Bush to E. Boerke regarding statistics for flying in NOCA. May 5, 2014.

**Buskirk, S.W. L.F. Ruggiero, K.B. Aubry, D.E. Pearson, J.R. Squires, and K.S. McKelvey**
2000 Comparative ecology of lynx in North America. Pages 397-417 In L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, and others. Ecology and conservation of lynx in the United States. Univ. of Colorado Press. 480 pp.

**Catton, T.**
1996 Wonderland: an Administrative History of Mount Rainier National Park. National Park Service, Cultural Resources Program. Seattle, Washington. Available at: http://www.nps.gov/history/history/online_books/mora/adhi/.

**Carey, A.B.**
1995 Sciurids in Pacific Northwest managed and old-growth forests. Ecological Applications 5(3):648-661.

**Christophersen R.G., R. C. Kuntz II, and J.F. McLaughlin**
2005 A Survey of Forest Carnivore Species Composition and Distribution in North Cascades National Park Service Complex, Washington. USDI National Park Service. Sedro Woolley, WA. NPS/PWR-NCCN/INV-2005/01. NPS D-271. 48 pp.

**Christophersen R.G.**
2006 Supplemental Forest Carnivore Surveys in North Cascades National Park Service Complex, Washington. USDI National Park Service. Sedro Woolley, WA. NPS/PWR-NCCN/INV-2006/01. NPS D280. 30 pp.

2014 Personal Communication. Email from R. Christophersen to E. Boerke regarding areas closures for wildlife. May 7, 2014.

**Copeland, J. P., K.S. McKelvey,K.B. Aubry, A. Landa, J. Persson, R.M. Inman, J. Krebs, E. Lofroth, H.Golden, J.R. Squires, A. Magoun, M.K. Schwartz, J. Wilmot, C.L. Copeland, R.E. Yates, I. Kojola, R.**
2010 The bioclimatic envelope of the wolverine (Gulo gulo): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology 88:233.

**Cornish, T.E., M.J. Linders, S.E. Little, and W.M. Vaner Haegen**
2001 Notoedric mange in western gray squirrels from Washington. Journal of Wildlife Diseases 37:630-633.

**Coulter, M.W.**
1966 "The Ecology and Management of Fishers in Maine." Dissertation, State University, College of Forestry at Syracuse University, NY.

**Cross, S. P.**
1969 Behavioral aspects of western gray squirrel ecology. Ph.D. Dissertation. University of Arizona, Tucson, AZ. 168 pp.

**Davis, M. H.**
1983 Post-release movements of introduced marten. J. Wildl. Manage. 47:59-66.

**Davis, R. J., K. M. Dugger, S. Mohoric, L. Evers, W. C. Aney**
2011 Northwest Forest Plan—the first 15 years (1994–2008): Status and trends of northern spotted owl populations and habitats. Gen. Tech. Rep. PNW-GTR-850. U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 147 p.

**Douglas, C.W. and M.A. Strickland**
1987 "Fisher." In Wild Furbearer Management and Conservation in North America, edited by M. J. Novak, A. Baker, M. E. Obbard, B. Malloch, 511–29. Ontario Ministry of Natural Resources, Toronto, Ontario, Cited in Jeffrey C. Lewis, 2006, Implementation Plan for Reintroducing Fishers (Martes pennanti) to Olympic National Park, Wildlife Program, Washington Department of Fish and Wildlife, Olympia, WA.

**Dhundale, J.**
2009 Mount Rainier National Park marbled murrelet 2009 progress report. Mount Rainier National Park, Ashford, WA. 23 pp.

**Edge, W. Daniel**
n.d. "Wildlife Values and Philosophies." Available at: <http://oregonstate.edu/instruct/fw251/notebook/values.html>.

**Endpcnoise.com**
n.d. "Decibels." Available at: <http://www.endpcnoise.com/cgi-bin/e/decibels.html>.

**Erdman, T.C., D.F. Brinker, J.P. Jacobs, J.Wilde, and T.O. Meyer**
1998 Productivity, population trend and status of northern goshawks, *Accipiter gentilis atricapillus,* in northeastern Wisconsin. Canadian Field-Naturalist. 112:17-27.

**Evans, M.**
2008 Cariboo-Chilcotin to Washington fisher translocation, 2007-2008 annual report. Washington Dept. Fish and Wildlife, Olympia. 15 pp.
2009 Cariboo-Chilcotin to Washington fisher translocation, 2008-2009 annual report. Washington Dept. Fish and Wildlife, Olympia. 21 pp.
2010 Cariboo-Chilcotin to Washington fisher translocation, 2009-2010 annual report. Washington Dept. Fish and Wildlife, Olympia. 27 pp.

**Finn, S.P., D.E. Varland, and J.M. Marzluff**
2002 Does Northern Goshawk breeding occupancy vary with nest-stand characteristics on the Olympic Peninsula, Washington? Journal of Raptor Research 35:265-279.

**Fontana, A. J., I. E. Teske, K. Pritchard, and M. Evans**
1999 East Kootenay fisher reintroduction program, 1996-1999. Ministry of Environment, Lands, and Parks, Cranbrook, British Columbia.

**Forsman, E. D., E. C. Meslow, and H. M. Wight**
1984 Distribution and Biology of the Spotted Owl in Oregon. Wildlife Monograph No. 87.

**Forsman, E. D., R. G. Anthony, K. M. Dugger, E. M. Glenn, A. B. Franklin, G. C. White, C. J. Schwarz, K. P. Burnham, D. R. Anderson, J. D. Nichols, J. E. Hines, J. B. Lint, R. J. Davis, S. H. Ackers, L. S. Andrews, B. L. Biswell, P. C. Carlson, L. V. Diller, S. A. Gremel, D. R. Herter, J. M. Higley, R. B. Horn, J. A. Reid, J. Rockweit, J. Schaberl, T. J. Snetsinger, and S. G. Sovern**
2011 Population demography of northern spotted owls: 1985–2008. Studies in Avian Biology 40. Cooper Ornithological Society.

**Foster, S.A.**
1992 Studies of ecological factors that affect the population and distribution of the western gray squirrel in northcentral Oregon. Dissertation, Portland State University, Portland, Oregon.

**Frankham, R.**
2008 Genetic Adaptation to Captivitiy in Species Conservation Programs. Molecular Ecology. 17 (325-333).

**Frost, H. C., and W. B. Krohn**
1994 Capture, care, and handling of fishers (Martes pennanti). Maine Agricultural and Forest Experimental Station, Tech. Bull. 157. Univ. of Maine, Orono.

**Frost, H.C., W.B. Krohn, and C.R. Wallace**
1997 "Age-specific Reproductive Characteristics in Fishers." In Journal of Mammalogy. 78(2):598-612.

**Gilbert, J.H., and L.B. Keith**
2001 "Impacts of Reestablished Fishers on Bobcat Populations in Wisconsin." In Proceedings of a Symposium on Current Bobcat Research and Implications for Management, The Wildlife Society 2000 Conference, Nashville, Tennessee, edited by A. Woolf, C. K. Nielson, and R. D. Bluett, 18–31. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington, Washington Department of Fish and Wildlife, Olympia, WA.

**Gilman, K.N.**
1986 The western gray squirrel (*Sciurus griseus*), its summer home range, activity times, and habitat usage in northern California. Thesis, California State University.

**Golightly, R. T., Penland, T. F., Zielinski, W. J., & Higley, J. M.**
2006 Fisher diet in the Klamath/North Coast Bioregion. Unpublished report, Department of Wildlife, Humboldt State University, Arcata, California.

**Goodman, David, and Richard S. Sojda**
2004 "Applying Advanced Technologies for Adaptive Management and Decision Support in Natural Resources." Available at <http://www.esg.montana.edu/esg/adaptive_mgmt_1.html>.

**Gosselink, T.E., T.R. VanDeelen, R.E. Wagner and P.C. Mankin**
2007 Survival and cause-specific mortality of red foxes in agricultural and urban areas of Illinois: Journal of Wildlife Management, 71:1862–1873.

**Gregory, S.C.**
2005 Seasonal movements and nest site selection of the western gray squirrel (Sciurus griseus) in the Methow River watershed. M.S. Thesis, University of Washington, Seattle, Washington, USA.

**Gutierrez, R.J., A. B. Franklin, and W. S. LaHaye**
1995 Spotted owl (Strix occidentalis) in The Birds of North America, No. 179 (A. Poole and F. Gill, eds.), The Academy of Natural Sciences, Philadelphia, Pennsylvania and the American Ornithologists' Union, Washington D.D.

**Hall, E.R.**
1942 "Gestation Period in the Fisher with Recommendations for the Animal's Protection in California." California Fish and Game. 28(3):143-147.

1981 Mammals of North America. John Wiley and Sons, Inc., New York, N.Y. 1181p.

**Hamer, T., N. Denis, and J. Harmon**
2005 Distribution and habitat characteristics of western gray squirrel nest sites in the Stehekin River Valley, North Cascades National Park. Report prepared for North Cascades National Park, Sedro Woolly, Washington. 44 pp.

**Hamer Environmental**
2000 Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

2009 Use of Radar to Determine the Presence/Absence of Marbled Murrelets in North Cascades National Park, Washington. 32 pp.

**Happe, P.J., K.J. Jenkins, M.K. Schwartz, J.C. Lewis, K.B. Aubry**
2014 Evaluation of Fisher Restoration in Olympic National Park and the Olympic Recovery Area: 2013 Annual Progress Report. Administrative Report

**Happe, P.**
2014a Personal Communication. Email from Patricia Happe to Elizabeth Boerke regarding flight hours at OLYM during the reintroduction on the Olympic Penninsula. May 9, 2014.

2014b Personal Communication. Email to Elizabeth Boerke. July 8, 2014.

**Hatler, D.F., M. Badry, and A.M.M. Beal**
2003 Furbearer Management Guidelines: Fisher (Martes pennant). British Columbia Ministry of the Environment. Available at <www.env.gov.bc.ca/fw/wildlife/trapping/docs/fisher.pdf.

**Hayes, G., and J. Lewis**
2006 Final Washington State Recovery Plan for the Fisher. Washington Department Fish and Wildlife, Olympia, WA. 62+ pp.

**Heinemeyer, K. S.**
1993 Temporal dynamics in the movements, habitat use, activity, and spacing of reintroduced fishers in northwestern Montana. Thesis, University of Montana, Missoula, Montana.

**Hershey, K. T., E. C. Meslow, and F. L. Ramsey**
1998 Characteristics of Forests at Spotted Owl Nest Sites in the Pacific Northwest. Journal of Wildlife Management 62:1398–1410.

**Hewitt, D.G., D.M. Keppie, and D.F. Stauffer**
2001 Predation effects on forest grouse recruitment. Wild. Soc. Bull. 29:16-23.

**Higley, J.M. and S. Matthews.**
2006 "Demographic Rates and Denning Ecology of Female Pacific Fishers (Martes pennanti) in Northwestern California: Preliminary Report: October 2004-July 2006." Hoopa Tribal Forestry, Hoopa, CA.

**Hodgson, Robert G.**
1937 Fisher Farming. Fur Trade Journal of Canada. Toronto

**Holling, C.S., ed.**
1978 Adaptive Environmental Assessment and Management. New York: John Wiley & Sons.

**Interagency Lynx Biology Team**
2013 Canada lynx conservation assessment and strategy. 3rd edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-13-19, Missoula, MT. 128 pp.

**Intergovernmental Panel on Climate Change (IPCC )**
2013 Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

2014 Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

**International Union for Conservation of Nature and Natural Resources (IUCN)**
1995 "IUCN/SSC Guidelines for Re-introductions." Forty-first meeting of the IUCN Council, Gland, Switzerland. May 1995. Available at <http://www.iucn.org/themes/ssc/pubs/policy/reinte.htm>.

**Jenkins, K. J., and P. J. Happe**
2013 Sampling design and field protocols for non-invasive fisher surveys on the Olympic Peninsula, Washington. U.S. Geological Survey, Olympic Field Station, Port Angeles, WA.

**Jenkins, K.J., P. C. Griffin, and M. E. Reid**
2013 Indicators for Habituated and Food-Conditioned Cascade Red Foxes in Mount Rainier National Park:Preliminary Assessment. U.S. Geological Survey Administrative Report to Mount Rainier National Park, U. S. National Park Service.

**Johnson, D. R., K. P. Foster, and K. L. Kerr**
1991 "Mount Rainier National Park 1990 Visitor Survey." Prepared for the National Park Service. Seattle, WA: Cooperative Park Study Unit, College of Forest Resources, University of Washington.

**Jones, J.L.**
1991 "Habitat Use of Fishers in North-central Idaho." Thesis, University of Idaho, Moscow. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington, Washington Department of Fish and Wildlife, Olympia, WA.

**Jones, J.L., and E.O. Garton**
1994 Selection of successional stages by fishers in north-central Idaho. Pages, 377-387 *in* S. W. Buskirk, A.S. Harestad, M.G. Raphael, and R.A. Powell, editors. Martens, sables and fishers: biology and conservation. Cornell University Press, Ithaca, New York, USA.

**Jule, K. R., Leaver, L. A., and Lea, S. E. G.**
2008 The effects of captive experience in reintroduction survival in carnivores: a review and analysis. Biol. Conserv. 141(2): 355-363.

**Kellert, S.R.**
1976 Study on the Attitudes of Americans Toward Wildlife. Yale University.

**Kessler, G.**
2014 Personal Communication. Email from G. Kessler to E. Boerke regarding five year average flights hours in MORA. August 5, 2014.

**Koehler, G.M.**
1990 Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology, 68:845-851.

**Koehler, G. M., B. T. Maletzke, J. A. Von Kienast, K. B. Aubry, R. B. Wielgus, and R. H. Naney**
2008 Habitat fragmentation and the persistence of lynx populations in Washington state. Journal of Wildlife Management 72: 1518-1524.

**Krebs, J.A. and D. Lewis.**
1997 Wolverine Ecology and Habitat Use in the North Columbia Mountains: Progress Report. In: Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk, Kamloops, B.C., 15 - 19 Feb.,1999. Volume Two. B.C. Ministry of Environment, Lands and Parks, Victoria, B.C. and University College of the Cariboo, Kamloops, B.C. 520pp.

**Krebs, J., E. Lafroth, J. Copeland, V. Banci,H . Golden, A. Magoun, R. Mulders, and B.Shults**
2004 Synthesis of survival rates and causes of mortality in North American wolverine. Journal of Wildlife Management 68:493-502.

**Krohn, W.B.**
2012 Distribution changes of American martens and fishers in eastern North America, 1699-2001. Pages 58-73 in K.B. Aubry, W.J. Zielinski, M.G. Raphael, G. Proulx, and S.W. Buskirk (eds.). Biology and Conservation of Martens, Sables, and Fishers: A New Synthesis. Cornell Univ. Press, Ithaca N.Y.

**Krohn, W.B., S.M. Arthur, and T.F. Paragi**
1994 Mortality and vulnerability of a heavily trapped fisher population. In S. W. Buskirk, A. Harestad, M. Raphael comps eds. Martens, sables and fishers: biology and conservation. Ithaca, NY: Cornell Univ. Press: 137-145.

**Krohn, W.B.; William J. Zielinski, R.B. Boone**
1997 "Relations among Fishers, Snow, and Martens in California: Results from Small-scale Spatial Comparisons." In Martes: Taxonomy, Ecology, Techniques and Management. Proceedings of the Second International Martes Symposium. August 12–16, 1995, Provincial Museum of Alberta, Edmonton, Alberta, Canada, edited by G. Proulx, H. N. Bryant, and P. M. Woodard, 211–32.

**Kuntz, R. C., and R. G. Christophersen**
1996 A Survey of Northern Spotted Owls in North Cascades National Park Service Complex, Washington. NRTR-96/05. Natural Resources Technical Report Series, NPS Denver Service Center, Denver, CO 80225.

**Kuntz, R.C. II and R.S. Glesne**
1993 A terrestrial vertebrate inventory of the Stehekin Valley, Lake Chelan National Recreation Area. USDI National Park Service, Technical Report NPS/PNRNOCA/NRTR-93/010. Sedro-Woolley, WA. 36 pp.

**LaBarge, T.**
1987 Notes on the management of fisher at Burnet Park Zoo. Anim. Keeper's Forum 14:404-414.

**Labaree, E.E.**
1941 Breeding and reproduction in fur bearing animals. Fur Trade Journal of Canada. Toronto

**Lawler, J.J., H.D. Safford, and E.H. Girvetz**
2012 "Martens and Fishers in a Changing Climate." In Biology and Conservation of Martens, Sables, and Fishers: A New Synthesis, edited by K.B. Aubry, W.J. Zielinski, M.G. Raphael, G. Proulx, and S.W. Buskirk, 371-397. Ithaca, New York: Cornell University Press.

**Lawler, J.J., T.H. Tear, C. Pyke, M.R. Shaw, P. Gonzalez, P. Kareiva, L. Hansen, L. Hannah, K. Klausmeyer, A. Aldous, C. Bienz, and S. Pearsall**
2009 "Resource Management in a Changing and Uncertain Climate." Frontiers in Ecology and the Environment. 7. DOI: 10.1890/070146

**Leonard, R.D.**
1980 "The Winter Activity and Movements, Winter Diet, and Breeding Biology of the Fisher (Martes pennanti) in Southeastern Manitoba." M.S. Thesis, University of Manitoba. 181 pp.

**Lewis County**
2002 Lewis County Comprehensive Plan. Accessible at: http://lewiscountywa.gov/communitydevelopment/comprehensive-plan and http://maps.lewiscountywa.gov/maps/DevelRegMaps/Zoning1in1mi.pdf. Accessed May 2, 2014.

**Lewis, J.C.**
2006 Personal Communication between J. Lewis, Washington Department of Fish and Wildlife and H. Schwantje, British Columbia Ministry of Environment.

2013a Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington. Washington Department of Fish and Wildlife. Olympia. 29pp.

2013b Personal Communication. Email correspondence with E. Boerke, North Cascades National Park, regarding "Comments on the Background Piece". November 22.

2014a Personal Communication. Internal meeting on the Superintendent's Briefing on Fisher Reintroduction into MORA and NOCA. January 9.

2014b Personal Communication. Email to Elizabeth Boerke. March 6.

2014c Post-Release Movements, Survival, and Resource Selection of Fishers (Pekania pennanti) Translocated to the Olympic Peninsula of Washington. PhD Dissertation. University of Washington, Seattle. 121 pp.

**Lewis, J.C., and P.J. Happe**
2008 Olympic fisher reintroduction project: 2008 progress report. Washington Department of Fish and Wildlife, Olympia. (available at: http://wdfw.wa.gov/wlm/diversty/soc/fisher/).

**Lewis, J.C., and P. J. Happe, K. J. Jenkins, and D. J. Manson**
2010 Olympic fisher reintroduction project: 2009 progress report. Washington Department of Fish and Wildlife, Olympia. (available at: http://wdfw.wa.gov/wlm/diversty/soc/fisher/).

2011 Olympic fisher reintroduction project: 2010 progress report. Washington Department of Fish and Wildlife, Olympia. (available at: http://wdfw.wa.gov/wlm/diversty/soc/fisher/).

**Lewis, J.C., and G.E. Hayes**
2004 Feasibility Assessment for Reintroducing Fishers to Washington. Washington Department of Fish and Wildlife, Olympia, WA.

**Lewis, J.C., and R.A. Powell, and W.J. Zielinski**
2012 Carnivore Translocations and Conservation: Insights from Population Models and Field Data for Fishers (Martes pennanti). PLoS ONE 7(3): e32726. doi:10.1371/journal.pone.0032726 (available at: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0032726)

**Lewis, J. C and D. W. Stinson**
1998 Washington State status report for the fisher. Washington Department of Fish and Wildlife, Olympia, Washington.

**Linders, M.J.**
2000. Spatial ecology of the western gray squirrel, (*Sciurus griseus*) in Washington: the interaction of season, habitat and home range. Thesis, University of Washington. 99p.

**Linders, M. J., and D. W. Stinson**
2007 Washington State recovery plan for the western gray squirrel. Washington Department of Fish and Wildlife, Olympia, Washington. 131 pages.

**Lofroth, E.C., Krebs, J.A., Harrower, W.L. & D. Lewis**
2007 Food habits of wolverine Gulo gulo in montane ecosystems of British Columbia, Canada. - Wildl. Biol. 13 (Suppl. 2): 31-37.

**Lofroth, E.C. , C.M. Raley J.M. Higley, R.l. Truex, J.S. Yaeger, J.C. LLewis, P.J. Happe, L.L. Finley, R.H. Naney, L.J. Hale, A.L. Krause, S.A. Livingston, A.M. Myers, and R.N. Brown**
2010 Conservation of Fishers (Martes pennanti) in South-Central British Columbia, Western Washington, Western Oregon, and California—Volume I, Conservation Assessment. USDI Bureau of Land Management, Denver, Colo.

**Long, R.A., J.S. Begley, P. MacKay, W.L. Gaines, and A.J. Shirk**
2013. The Cascades Carnivore Connectivity Project: A landscape genetic assessment of connectivity for carnivores in Washington's North Cascades Ecosystem. Final report for the Seattle City Light Wildlife Research Program, Seattle, Washington. Western Transportation Institute, Montana State University, Bozeman. 57 pp.

**Mace, R.D. and C.J. Jonkel**
1986 Local Food Habits of the Grizzly Bear in Montana. 1986. Bears: Their Biology and Management 6: 105-110.

**Magoun J. and J.P. Copeland**
1998 Characteristics of wolverine reproductive den sites. Journal of Wildlife Management. Vol. 62, No. 4. pp. 1313-1320.

**Maletzke, B. T., G. M. Koehler, R .B. Wielgus, and K .B. Aubry**
2008 Habitat conditions associated with lynx hunting behavior during winter in Northern Washington. Journal of Wildlife Management 72:1473–1478.

**Martin, S. K.**
1994. Feeding ecology of American martensand fishers. Pages 297-315 *in* S. W. Buskirk, A.S. Harestad, M. G. Raphael, and R. A. Powell, eds. Martens, sables, and fishers: biology and conservation. Cornell University Press, Ithaca, New York.

**Mawdsley, J.R., R. O'Malley, and D.S. Ojima**
2009 "A Review of Climate-Change Adaptation Strategies for Wildlife Management and Biodiversity Conservation." Conservation Biology. 23,5: 1080-1089. Society for Conservation Biology. DOI: 10.1111/j.1523-1739.2009.01264.x

**McKelvey, K.S., J.J. Claar, G.W. McDaniel, and G. Hanvey**
1999 National lynx detection protocol. U.S. Department of Agriculture, Rocky Mountain Research Station, Missoula, MT.

**Minnesota Pollution Control Agency**
1999 "A Guide to Noise Control in Minnesota: Acoustical Properties, Measurement, Analysis, Regulation." Available at <http://www.nonoise.org/library/sndbasic/sndbasic.htm#2.1>.

**Mitcheltree, D. H., T. L. Serfass, M. T. Whary, W. M. Tzilkowski, R. P. Brooks, and R. L. Peper**
1997 Captive care and clinical evaluation of fishers during the first year of a reintroduction project. Pages 317-328 in G. Proulx, H. N. Bryant, and P. M. Woodard, eds. Martes: taxonomy, ecology, techniques and management. Provincial Museum of Alberta, Edmonton, Alberta, Canada.

**Mote, P., A. K. Snover, S. Capalbo, S. D. Eigenbrode, P. Glick, J. Littell, R. Raymondi, and S. Reeder**
2014 Ch. 21: Northwest. Climate Change Impacts in the United States: The Third National Climate Assessment, J.M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 487-513. Doi:10.7930/JO4Q7RWX.

**Mowat, G., and D. Paetkau**
2002 Estimating marten Martes Americana population size using hair capture and genetic tagging. Wildl. Biol. 8:201-209.

**Munro, R.H.M., S.E. Nielson, M.H. Price, G.B. Stenhouse and M.S. Boyce**

2006 Seasonal and diel patterns of grizzly bear diet and activity in west-central Alberta. Journal of Mammalogy 87(6): 1112-1121.

**Myers, E.G**

2009 Mount Rainier National Park Northern Spotted Owl Demographic Monitoring, Draft 2009 Progress Report. Mount Rainier National Park, Ashford, WA.

**National Park Service, U.S. Department of the Interior (NPS).**

n.d.a National Park Service Visitor Use Statistics. IRMA Data System. Available at: https://irma.nps.gov/Stats/Reports/Park. Accessed on March 25, 2014.

n.d.b Park Species Lists. Inventorying and Monitoring, North Coast and Cascades Network (NCCN). Available at http://science.nature.nps.gov/im/units/nccn/npspecies.cfm. Accessed on June 5, 2014.

1923 Mount Rainier Nature Notes Vol. 1 No. 4

1986 Historic Resource Study for North Cascades National Park Service Complex. Pacific Northwest Region, Recreation Resources and Professional Services, Cultural Resources Division. Washington.

1987 General Management Plan and Environmental Assessment for North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Park.

1989 Wilderness Management Plan for Mount Rainier National Park. NPS D-239.

1995a Final General Management Plan and Environmental Impact Statement for Lake Chelan National Recreation Area. NPS D-174A.

1995b Goats in Olympic National Park Draft Environmental Impact Statement for Mountain Goat Management. Olympic National Park, Port Angeles, WA.

2001a Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making, and Handbook for Environmental Impact Analysis. Washington, DC. Available at <http://www.nps.gov/policy/ DOrders/DOrder12.html> and <http://www.nps.gov/policy/DOrders/RM12.pdf>.

2001 Mount Rainier National Park Final General Management Plan Environmental Impact Statement. Denver, CO. NPS 105/01-36 Available at: <www.nps.gov/mora/parkmgmt/index.htm>

2005a Mount Rainier National Park Fire Management Plan / Environmental Assessment. April 2005. Available at http://parkplanning.nps.gov/projectHome.cfm?projectID=12575.

2005b North Cascades National Park Service Complex Fire Management Program / Environmental Assessment. May 2005. Tic # 118396. Available at <https://parkplanning.nps.gov/noca_FMP>

2006a NPS Management Policies 2006. Washington, DC. Available at <http://www.nps.gov>.

2007a Olympic National Park Fisher Reintroduction Plan/Environmental Assessment. Olympic National Park, Olympic, WA. September 2007. Available at <http://parkplanning.nps.gov/projectHome.cfm?parkId=329&projectId=10586>

2007b Restoration of Fishers to Olympic National Park and Olympic Peninsula Biological Assessment. National Park Service.

2008a North Cascades National Park Service Complex. Acoustic Monitoring Report. Natural Resource Report NPS/NRPC/NRTR—2008/001. National Park Service, Fort Collins, CO.

2008b North Cascades National Park Service Complex. Acoustic Monitoring Report. Natural Resource Report 2006-2008. National Park Service, Fort Collins, CO.

2009 Mount Rainier National Park. Acoustic Monitoring Snapshot. National Park Service, Natural Resource Program Center, Natural Sounds Program, Fort Collins, CO.

2011 Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making, and Handbook for Environmental Impact Analysis. Washington, DC. Available at <http://www.nps.gov/policy/ DOrders/DOrder12.html> and <http://www.nps.gov/policy/DOrders/RM12.pdf>.

2012a North Cascades National Park Complex Foundation Document. NPS: 168/114307 Available at < http://parkplanning.nps.gov/projectHome.cfm?projectID=16940>

2012b Ross Lake National Recreation Area General Management Plan. Sedro-Woolley, WA. NPS 168/114166 Available at < http://parkplanning.nps.gov/projectHome.cfm?projectID=16940>

2012c Revisiting Leopold: Resource Stewardship in the National Parks. A Report of the National Park System Advisory Board Science Committee. Washington, D.C. Available at < http://www.nps.gov/calltoaction/PDF/LeopoldReport_2012.pdf>

**Naney, R.H., L.L. Finley, E.C. Lofroth, J.J. Happe, A.L. Krause, C.M. Raley, R.L..Truex, L.J. Hale, J.M. Higley, A.D. Kosic, J.C. Lewis, S.A. Linvingston, D.C. Macfarlane, A.M. Myers, and J.S. Yaeger**
2012 Conservation of Fishers (Martes pennanti) in South-Central British Columbia, Western Washington, Western Oregon, and California--Volume III, Threat Assessment. USDI Bureau of Land Management, Denver, Colo.

**Nelson, S.K. and T. E. Hamer**
1995 Nest success and the effects of predation on Marbled Murrelets. Pages 89-98 in C. J. Ralph, G. L. Hunt, Jr., M. G. Raphael, J. F. Piatt, eds. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-152. U.S. Forest Service, Pacific Southwest Research Station, Albany, California.

**Nelson, S. K., M. H. Huff, S. L. Miller, M. G. Raphael**
2006 Marbled murrelet biology: habitat relations and populations. In: Huff, M. H.; Raphael, M. G.; Miller, S.L.; Nelson, S.K.; Baldwin, J., tech cords. Northwest Forest Plan-The first 10 years (1994-2003): status and trends of populations and nesting habitat for the marbled murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR:U.S. Dept. of Agriculture, Forest Service, Pacific Northwest Research Station: 9-30. Chapter 2.

**Nyberg, J.B.**
1998 "Statistics and the Practice of Adaptive Management." Statistical Methods for Adaptive Management Studies. Land Management Handbook for the British Columbia Ministry of Forests Research Program. Victoria, BC.

**Paragi, T.F.**
1990 "Reproductive Biology of Female Fishers in Southcentral Maine." Thesis, University of Maine, Orono. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, *Feasibility Assessment for Reintroducing Fishers to Washington*, Washington Department of Fish and Wildlife, Olympia, WA.

**Paragi, T.F., S.M. Arthur, and W.B. Krohn**
1996 "Importance of Tree Cavities as Natal Dens for Fishers." In *Northern Journal of Applied Forestry*. 13(2):79-83

**Pearson, S.F., M.G. Raphael, M.M. Lance, and T. D. Bloxton, Jr.**
2011 Washington 2010 at-sea marbled murrelet population monitoring: Research Progress Report. Washington Department of Fish and Wildlife, Wildlife Science Division and USDA Forest Service Pacific Northwest Research Station, Olympia, WA.

**Pierce County**
2014 County Code: Article II Zoning Districts; Use Regulations. Accessed at: http://www.ecode360.com/9819315 and http://yakima.co.pierce.wa.us/MapGallery/index.cfm?event=displayMapInformation&id=198 on May 2, 2014.

**Powell, R.A.**
1993 The Fisher: Life History, Ecology, and Behavior. 2nd ed. Minneapolis: University of Minnesota Press.

**Powell, R.A., and W.J. Zielinski**
1994 "Fisher." In The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States, edited by L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, 28–73. General Technical Report RM- 254. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington, Washington Department of Fish and Wildlife, Olympia, WA.

**Proulx, G., A. J. Kolenosky, M. Badry, R. K. Drescher, K. Seidel, and P. J. Cole**
1994 Post-release movements of translocated fishers. Pages 197-203 in S. W. Buskirk, A. Harestad, and M. Raphael,editors. Martens, sables, and fishers: biology and conservation. Cornell University Press, Ithaca, New York.

**Quinn, N. W. S. and G. Parker**
1987 Lynx. Pages 683-694 in M. Novak, J.A. Barber, M.E. Obbard, B. Malloch (eds.). Wild furbearer management and conservation in North America. Ontario Ministry of Natural Resources.

**Raedeke Associates**
2013 Rainier spotted owl demography study area. Annual report 2013. Raedeke Associates, Inc., Seattle, WA. 47pp.

**Raley, C.M., E.C. Lofroth, R.L. Truex, J.S. Yaeger and J.M. Higley**
2012 Habitat ecology of fishers in western North America: a new synthesis. Pages 231-254 in K.B. Aubry, W.J. Zielinski, M.G. Raphael, G. Proulx and S.W. Buskirk, editors. Biology and Conservation of Martens, Sables, and Fishers: A New Synthesis. Cornell University Press, Ithaca, New York.

**Raphael, M.G., G.M. Gelleher, M.H. Huff, S.L. Miller, S.K. Nelson, and R. Young**
2006 Spatially-explicit estimates of potential nesting habitat for the marbled murrelet. Chapter 5 in: Marbled Murrelet Effectiveness Monitoring Team; M. Huff, Tech. Coord. Northwest Forest Plan – The first 10 years (1994- 2003): Status and trend of populations and nesting habitat for the marbled murrelet. Gen. Tech. Report. PNW-GTR-650. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

**Raine, R. M.**
1987 Winter food habits and foraging behavior of fishers (Martes pennanti) and martens (Martes americana) in southeastern Manitoba. Can. J. Zool. 65: 745-747.

**Ralls, K., R. A. Garrott, D. B. Siniff, and A. M. Starfield**
1992 Research on threatened populations. Pages 197-216 in D. M. McCullough and R. H. Barrett, editors. Wildlife 2001: populations. Elsevier Applied Science, New York, New York, USA.

**Raphael, M.**
2007 Investigators annual report to Olympic National Park: Research Permit No. OLYM-2007-SCI-00, Study No. OLYM-160 NPS files. Unpublished report.

**Reading, R.P. and T.W. Clark**
1996 "Carnivore Reintroductions: An Interdisciplinary Examination." In Carnivore Behavior, Ecology, and Evolution, edited by J. L. Gittleman, vol. 2, 296–336. Ithaca: Cornell University Press.

**Regional Ecosystem Office (REO)**
1998 The Northwest Forest Plan Revisited. Portland, OR. Available at <http://www.reo.gov/library/reports/NFP_revisited.htm >.

2014 "About the Northwest Forest Plan (NWFP)." Portland, OR. Available at <http://www.reo.gov/general/aboutNWFP.htm>.

**Rego, P. W**.
1989 Wildlife investigation: fisher reintroduction, 10/1/88-9/30/89. Project number W-49-R-14 performance report. Connecticut Dept. Envir. Protect., Wildl. Div., Burlington. 7 pp.

**Reid, M., J. Petterson, and J. Schaberl.**
2010 A survey of forest carnivores in Mount Rainier National Park, Washington: National Park Service, North Coast and Cascades Network. Natural Resource Technical Report NPS/NCCN/NRTR—2010/412. National Park Service, Fort Collins, Colorado.

**Riley, S. P., Pollinger, J. P., Sauvajot, R. M., York, E. C., Bromley, C., Fuller, T. K., & Wayne, R. K.**
2006 FAST- TRACK: A southern California freeway is a physical and social barrier to gene flow in carnivores. Molecular Ecology, 15:1733-1741.

**Roberson, A.M., D.E. Andersen, and P.L. Kennedy**
2003 The Northern Goshawk (Accipiter gentilis atricapillus) in the Western Great Lakes Region: A Technical Conservation Assessment. U.S. Geological Survey, Minnesota Cooperative Fish & Wildlife Research Unit, University of Minnesota, St. Paul, MN.

**Roy, K. D.**
1991 Ecology of reintroduced fishers in the Cabinet Mountains of northwest Montana. Thesis, University of Montana, Missoula.

**Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S.McKelvey, and J.R. Squires**
2000 Ecology and conservation of lynx in the United States. Univ. of Colorado Press and USDA Rocky Mountain Research Station. 480 pp.

**Ryan, L.A. and A.B. Carey**
1995 Distribution and habitat of the western gray squirrel (Sciurus griseus) on Fort Lewis, Washington. Northwest Science 69(3):204-216.

1995b Biology and management of the western gray squirrel and Oregon white oak woodlands: with emphasis on the Puget Trough. Gen. Tech. Rep. PNW-GTR-348. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

**Sacks, B.N., M.J. Statham, J.D. Perrine, S.M. Wisely, S.M., and K.B. Aubry.**
2010 North American montane red foxes—Expansion, fragmentation, and the origin of the Sacramento Valley red fox. Conservation Genetics, 11: 1523–1539.

**Sargeant, A.B., and S.H. Allen**
1989 Observed interactions between coyotes and red foxes: Journal of Mammalogy, v. 70, p. 631–633.

**Sauk-Suiattle Indian Tribe**
2007 Homepage. Available at Sauk-suiattle.com. Accessed on July 1, 2014.

**Scheffer, V.B.**
1995 "Mammals of the Olympic National Park and Vicinity": Northwest Fauna, vol. 2. Cited in Jeffrey C. Lewis, 2006, Implementation Plan for Reintroducing Fishers (Martes pennanti) to Olympic National Park, Wildlife Program, Washington Department of Fish and Wildlife. Olympia, WA.

**Schomer, Paul**
2001 "A White Paper: Assessment of Noise Annoyance." Champaign, IL: Schomer and Associates.

**Seglund, A.E.**
1995 "The Use of Resting Sites by the Pacific Fisher." Thesis, Humboldt State University, Arcata California. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington, Washington Department of Fish and Wildlife, Olympia, WA.

**Serrouya, R., B.N. Mclellan, G.D. Pavan, and C.D. Apps.**
2011 Grizzly bear selection of avalanche chutes: Testing the effectiveness of forest buffer retention. The Journal of Wildlife Management 75(7): 1597–1608.

**Siegel, R. B., K. E. Jablonski, M. N. Scholer, R. C. Kuntz II, and R. L. Wilkerson**
2009b Surveying for Spotted Owls on the east slope of North Cascades National Park Service Complex, 2007-2008. Natural Resource Technical Report NPS/NCCN/NRTR—2009/184. National Park Service, Fort Collins, CO.

**Siegel, R. B., R. C. Kuntz II, R. L. Wilkerson, K. D. Kuhlman, and M. C. Toshack**
2012 Surveying for Spotted Owls in the Upper Skagit watershed of North Cascades National Park Complex, 2009–2010. Natural Resource Technical Report NPS/NOCA/NRTR—2012/597. National Park Service, Fort Collins, CO.

**Sikes, R. S., W. L. Gannon, and the Animal Care and Use Committee of the American Society of Mammalogists**
2011 Guidelines of the American Society of Mammalogists for the use of wild mammals in research. Journal of Mammalogy 92(1):235-253.

**Simmons, T., M. Littlejohn, and W. Morse**
2001 Mount Rainier National Park Visitor Study, Summer 2000. Visitor Services Project, Report 124, Park Studies Unit, University of Idaho, Moscow.

**Skagit County**
2007 Skagit County Comprehensive Plan. Available at: http://www.skagitcounty.net/Departments/PlanningAndPermit/comp_toc.htm. Accessed May 2, 2014.

**Smith, M.R., P.W. Mattocks, Jr., and K.M. Cassidy**
1997 "Breeding Birds of Washington State." In volume 4, Washington State Gap Analysis - Final Report, eds. K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, eds. Seattle Audubon Society Publications in Zoology No. 1, Seattle, WA.

**Snyder, N.F.R., S.R. Derrickson, S.R. Beissinger, J.W. Wiley, T.B. Smith, W.D. Toone, B. Miller**
1996 Limitation of Captive Breeding in Endangered Species Recovery. Conservation Biology 10:2 (338-348).

**Squires, J.R., J.P. Copeland, T.J. Ulizio, M.K. Schwartz, and L.F. Ruggiero**
2007 Sources and Patterns of Wolverine Mortality in Western Montana. Journal of Wildlife Management 71:2213-2210.

**Squires, J. R. and R.T. Reynolds**
1997 Northern Goshawk (Accipiter gentilis). In A. Poole and E. Gill [Eds.], The birds of North America, No. 298. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, DC U.S.A.

**Strauch, R.L., C.L. Raymond, and A.F. Hamlet**
2013 Chapter 4: Climate Change, Hydrology, and Access in the North Cascades Range. *Climate Change vulnerability and Adaptation in the North Cascades Region*, *Washingon*, C.L. Raymond, D.L. Peterson, and R.M. Rochefort, Eds. Unpublished Gen. Tech. Report. PNW-GTR-XXX. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

**Squires, J. R.**
2000 Food Habits of Northern Goshawks Nesting in South Central Wyoming. The Wilson Bulletin 112:536-539.

**Stinson, D. W.**
2001 Washington state recovery plan for the lynx. Washington Department of Fish and Wildlife, Olympia, WA. 78 p.

**Taylor, W. P., and W. T. Shaw**
1927 Mammals and birds of Mount Rainier National Park. U.S. Government Printing Office,Washington, D.C.

**The Herald of Everett, Washington**
2012 Cougar prowling Arlington caught, release in wild. 24 May 2012.

**Thomas, J. W., E. D. Forsman, J. B. Lint, E. C. Meslow, B. R. Noon, and J. Verner**
1990 A Conservation Strategy for the Northern Spotted Owl. Report of the Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl." Portland, OR.

**Trombulak, S.C., and C.A. Frissell**
2000 Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology , Vol. 14, pp. 18-30

**Truex, R.L., W.J. Zeilinski, R.T. Gologhtly, R.H. Barrett, and S.A. Wisely**
1998 "A Meta-analysis for Regional Variation in Fisher Morphology, Demography, and Habitat Ecology in California." Final Report to the California Department of Fish and Game. U.S. Forest Service, Pacific Southwest Research Station, Arcata, CA.

**U.S. Census Bureau, U.S. Department of Commerce**
2010 Community Facts. American FactFinder. Available at http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml#none. Accessed on July 7, 2014.

**U.S. Department of the Interior**
1915 Annual Report of the Secretary of the Interior. Available at: https://archive.org/details/reportsofdepartm1401unit.

**U.S. Fish and Wildlife Service, U.S. Department of the Interior (USFWS).**
n.d.(a) "Endangered Species Habitat Conservation Planning — Incidental Take Permits." Available at <http://www.fws.gov/endangered/HCP/index.html>.

1990 Endangered and threatened wildlife and plants; determination of threatened status for the northern spotted owl. Fed. Reg. Vol. 55. 123: 26114-26194. June 26, 1990.

1997 Recovery plan for the threatened marbled murrelet (Brachyramphus marmoratus) in Washington, Oregon, and California. U.S. Fish and Wildlife Service, Portland, Oregon. 203 pp.

2000 Determination of Threatened Status for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Related Rule. Federal Register 65: 16051-16086.

2004b "Fisher. Martes pennanti. Endangered Species Fact Sheet." Available at <http://www.fws.gov/oregonfwo/Species/Data/Fisher/default.asp>.

2006 Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx: final rule. Federal Register 71: 66008-66061.

2008 Final recovery plan for the northern spotted owl, Strix occidentalis caurina. U.S. Fish and Wildlife Service, Portland, Oregon. xii + 142 pp.

2013a Endangered and Threatened Wildlife and Plants; Status Review of the West Coast Distinct Population Segment of the Fisher as Endangered or Threatened. Federal Register 78(53):16828-16829.

2013b Threatened Status for the Distinct Population Segment of the North American Wolverine Occurring in the Contiguous United States; Establishment of a Nonessential Experimental Population of the North American Wolverine in Colorado, Wyoming, and New Mexico; Proposed Rules. Federal Register 78: 7864-7890.

2013c Biological opinion for effects to northern spotted owls, critical habitat for northern spotted owls, marbled murrelets, critical habitat for marbled murrelets, bull trout, and critical habitat for bull trout from selected programmatic forest management activities March 25, 2013 to December 31, 2023 on the Olympic National Forest, Washington. USFWS Reference: 13410-2009-F-0388. U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, Lacey, WA. 404 pp.

2014a Species Profile for Marbled Murrelet: Life History. Available at < http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08C

2014b Species Profile for Northern Spotted Owl. Available at < http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08B

2014d Species profile. Northern Goshawk. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B095

**United States Forest Service (USFS)**

n.d.(a) Listing of All Timber Sales. Mt. Baker-Snoqualmie National Forest. Available at http://www.fs.usda.gov/wps/portal/fsinternet/!ut/p/c5/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gDfxMDT8MwRydLA1cj72BTH1NTAwgAykeaxRtBeY4WBv4eHmF-YT4GMHkidBvgAI6EdIeDXIvfdrAJuM3388jPTdUvyA2NMMgyUQQAO4WSww!!/dl3/d3/L2dJQSEvUUt3QS9ZQnZ3LzZfME80MEkxVkFCOTBFMktTNU41NTAwMDAwMDA!/?ss=110605&navtype=110605&cid=STELPRDB5162983&navid=130120000000000&pnavid=130000000000000&position=TimberSales*&groupid=Y&ttype=detaillist&pname=Mt.%20Baker-Snoqualmie%20National%20Forest%20-%20Resource%20Management. Accessed July 1, 2014.

n.d.(b) Invasive Weed Program: Program Highlights. Gifford Pinchot National Forest. Available at http://www.fs.usda.gov/detail/giffordpinchot/landmanagement/resourcemanagement/?cid=stelprdb5172048. Accessed on May 17, 2014.

n.d.(c) Secure Rural School and Community Self-Determination Act. Accessible at https://fsplaces.fs.fed.us/fsfiles/unit/wo/secure_rural_schools.nsf. Accessed on May 2, 2014.

n.d.(d) Timber & special Forest Products Sales Overview. Gifford Pinchot National Forest. Available at http://www.fs.usda.gov/detail/giffordpinchot/landmanagement/resourcemanagement/?cid=stelprdb5344807. Accessed July 1, 2014.

2005 Decision Notice and Finding of No Significant Impact: Proposed Treatment of Invasive Plants and New Invaders Strategy – Forest Plan Amendment #26. USDA Forest Service – Mt. Baker-Snoqualmie National Forest. Available at: http://www.fs.usda.gov/detail/mbs/landmanagement/resourcemanagement/?cid=fsbdev7_001624. Accessed on May 16, 2014.

2008 Record of Decision and Final Environmental Impact Statement and Forest Plan Amendment #20. Gifford-Pinchot National Forest and Columbia River Gorge National Scenic Area Site-Specific Invasive Plant Treatment Project and Forest Plan Amendment. United States Department of Agriculture, Forest Service, Pacific Northwest Region. Available at: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5308520.pdf. Access on May 17, 2014.

2013 FY2013 Sold Timber Sales. Okanogan Wenatchee National Forest. Available at http://www.fs.usda.gov/resourcedetail/okawen/landmanagement/resourcemanagement/?cid=STELPRDB5404441. Accessed July 1, 2014.

**USDA Forest Service and USDI Bureau of Land Management (USDS and USDI)**

1994 Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. USDA Forest Service and USDI Bureau of Land Management, Portland, Oregon.

**Vashon, J., S. McLellan, S. Crowley, A. Meehan, and K. Laustsen**

2012 Canada lynx assessment. Maine Department of Inland Fish and Wildlife, Research and Assessment Section, Bangor, ME.

**Wahl, T.R.**

1995 The Birds of Whatcom County. T.R. Wahl, Bellingham, WA.

**Waller J.S. and R.D. Mace**

1997 Grizzly bear habitat selection in the Swan Mountains, Montana. J. Wildl. Manage. 61(4): 1032-1039.

**Warheit, K. I.**

2004 Fisher (Martes pennanti) control region sequences from Alberta, and re-analysis of sequences from other regions in North America: recommendations for the re-introduction of fishers into Washington. Draft report submitted to Fisher Science Team. Washington Department of Fish and Wildlife, Olympia, WA, USA.

**Washington Department of Fish and Wildlife (WDFW)**

n.d. Furbearer Trapping Seasons and Rules. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, WA. Available at <http://wdfw.wa.gov/publications/01419/wdfw01419.pdf> Accessed on March 7, 2014.

n.d. Washington Trappers' Report of Catch Statewide Summary for the 2009 Season. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, WA. Available at < http://wdfw.wa.gov/hunting/harvest/2009/trapper.php> Accessed on March 7, 2014.

1993 Status of the western gray squirrel (Sciurus griseus) in Washington. Unpubl. Rep. Wash. Dept. Wildl., Olympia. Available at http://wdfw.wa.gov/publications/01525/wdfw01525.pdf.

2004 Management Recommendations for Washington's Priority Species, Volume 4: Birds. Available at <http://wdfw.wa.gov/hab/phs/vol4/birdrecs.htm>.

2013a 2013 Game Status and Trend Report. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, WA. Available at < http://wdfw.wa.gov/conservation/game/> Accessed on March 7, 2014.

2013b Washington's 2013 Big Game Hunting Seasons & Regulations. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, WA. Available at < http://wdfw.wa.gov/hunting/regulations/> Accessed on March 7, 2014.

2013c 2012 Annual Report. Wolverine. Available at http://wdfw.wa.gov/conservation/endangered/species/wolverine.pdf

**Washington Department of Natural Resources (WDNR)**

1997 Habitat Conservation Plan. Washington Department of Natural Resources, Olympia. Washington

2004 Policy for Sustainable Forests. Available at http://www.dnr.wa.gov/ResearchScience/Topics/StateTrustLandsForestManagement/Pages/policy_for_sustainable_forests.aspx. Accessed on July 1, 2014.

2014a Sustainable Harvest Calculation. Available at http://www.dnr.wa.gov/BusinessPermits/Topics/SustainableHarvestImplementation/Pages/lm_sust_harvest_implement.asp. Accessed on July 1, 2014.

2014b Timber Sales. http://www.dnr.wa.gov/BUSINESSPERMITS/TIMBERSALES/Pages/Home.aspx. Accessed on July 1, 2014.

2014c Timber Sale Auction Results. Available at http://www.dnr.wa.gov/BusinessPermits/Topics/TimberSaleAuction/Pages/psl_ts_auction_results.aspx. Accessed on July 1, 2014.

**State Department of Transportation (WSDOT)**

2012 2012 Annual Traffic Report. Available at <http://www.wsdot.wa.gov/mapsdata/travel/pdf/Annual_Traffic_Report_2012.pdf>

**Washington State Office of Financial Management (WSOFM)**

2012 Forecast of the State Population, November 2012 Forecast. Olympia, WA. Available at http://www.ofm.wa.gov/pop/stfc/stfc2012/stfc_2012.pdf

**Watson, J. W., D. W. Hays, S. P. Finn, and P. Meehan-Martin**

1998 Prey of breeding Northern Goshawks in Washington. Journal of Raptor Research 32:297-305.

**Weir, R. D.**

1995 Diet, spatial organization, and habitat relationships of fishers in south-central British Columbia. Thesis, Simon Fraser Univ., Burnaby, British Columbia.

2003 "Status of the Fisher in British Columbia." Wildlife Bulletin B-105. B.C. Ministry of Water, Land and Air Protection, Victoria, British Columbia. Cited in Jeffrey C. Lewis, 2006, Implementation Plan for Reintroducing Fishers (Martes pennanti) to Olympic National Park, Wildlife Program, Washington Department of Fish and Wildlife, Olympia, WA.

2005 Personal Communication. E-mail correspondence with P. Steinholtz, URS. July 19, 2005

2007 Fisher Ecology in the Kiskatinaw Plateau Ecosection: Inventory and research: yearend report. B.C. Ministry of Environment.

2014 Personal Communication. E-mail to Jeff Lewis. January 15, 2014.

**Weir, R.D. and F.B. Corbould**

2006 Density of fishers in the sub-boreal spruce biogeoclimatic zone of British Columbia. Northwestern Naturalist 87:118-127.

**Weir, R.D., and A.S. Harestad**

2003 "Scale-dependent Habitat Selectivity by Fishers in South-Central British Columbia." Journal of Wildlife Management 67:73–82. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington, Washington Department of Fish and Wildlife, Olympia, WA.

**Weir, R.D., A. S. Harestad, and R. C. Wright**

2005 Winter diet of fishers in British Columbia. Northwestern Naturalist 86:12-19.

**West, J.M., S.H. Julius, P. Kareiva, C. Enquist, J.J. Lawler, B. Petersen, A.E. Johnson, and M.R. Shaw.**

2009 "U.S. Natural Resources and Climate Change: Concepts and Approaches for Management Adaptation". Environmental Management. 44: 1001-1021. DOI: 10.1007/s00267-0099-9345-1

**Weir, R. D., M. Phinney, and E. C. Lofroth**

2012 Big, sick, and rotting: Why tree size, damage, and decay are important to fisher reproductive habitat. Forest Ecology and Management 265: 230-240.

**Wengert, G.M.**

2013 Ecology of Intraguild Predation on Fishers (Martes pennanti) in California. PhD dissertation. University of California, Davis. 119 pp.

**Wengert, G.M., M.G. Gabriel, J.E. Foley, T. Kun and B.N. Sacks**

2013 Field and molecular techniques for identifying intraguild predators of fishers and other North American small carnivores. Wildlife Society Bulletin 37:659-663.

**Whatcom County**

2014 Whatcom County Code. Accessible at : http://www.codepublishing.com/wa/whatcomcounty/. Accessed on May 2, 2014.

**Wiles, G. J., H. L. Allen, and G. E. Hayes**
2011 Wolf conservation and management plan for Washington. Washington Department of Fish and Wildlife, Olympia, WA. 297 p.

**Williams, B.K.**
1997 "Approaches to the Management of Waterfowl under Uncertainty". Wildlife Society Bulletin. 25:714–20.

**Winings, C. J., and E. G. Neel**
2013 North Cascades National Park Complex: Acoustic monitoring 2009-2011. Natural Resource Technical Report NPS/NOCA/NRTR—2013/767. National Park Service, Fort Collins, Colorado.

**Woodworth, L.M., M.E. Montgomery, D.A. Briscoe, R. Frankham**
2002 Rapid Genetic Deterioration in Captive Populations: Causes and Conservation Implications. Conservation Genetics. 3(277-288).

**Vander Haegen , M. W., G.R. Orth, and M.J. Linders**
2013 Survival and causes of mortality in a northern population of western gray squirrels. The Journal of Wildlife Management. Volume 77, Issue 6, Pages 1081–1292.

**Yocum, C. F.**
1974 Recent wolverine records in Washington and Oregon. The Murrelet. 55:11-18.

**York, E.C.**
1996 "Fisher Population Dynamics in North-central Massachusetts." Thesis, University of Massachusetts, Amherst.

**Zielinski, W.J. and T.E. Kucera (eds.)**
1995 American marten, fisher, lynx, and wolverine; survey methods for their detection. Gen. Tech. Rep. PSW-GTR-157. Pacific Southwest Research Station, Forest Service, U.S. Dept. of Agric.

**Zielinski, W.J., N.P. Duncan, E.C. Farmer, R.L. Truex, A.P. Clevenger, and R.H. Barrett**
1999 "Diet of Fishers (Martes pennanti) at the Southernmost Extent of Their Range." Journal of Mammalogy 80:961–71. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington, Washington Department of Fish and Wildlife.

**Zielinski, W.J., R.L. Truex, G.A. Schmidt, F.V. Schlexer, K.N. Schmidt, and R.H. Barrett**
2004 "Resting Habitat Selection by Fishers in California." Journal of Wildlife Management 68. Cited in Jeffrey C. Lewis and Gerald E. Hayes, 2004, Feasibility Assessment for Reintroducing Fishers to Washington, Washington Department of Fish and Wildlife, Olympia, WA.

**Zielinski, W.J., R.L. Truex, J.R. Dunk, and T. Gaman**
2006 Using Forest Inventory Data to Assess Fisher Resting Habitat Suitability in California. Ecological Applications 16:1010-1025.

**Zimmerman, G.S., R.R. Horton, D.R. Dessecker, and R.J. Gutierrez**
2008 New insight to old hypotheses: ruffed grouse population cycles. Wilson Jour. Ornith. 120:239-247.

*Credit: WDFW Photo by J. Jacobson*

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS • NOCA and MORA • 2014

Printed on Recycled Paper

**National Park Service**
**U.S. Department of the Interior**

Prepared by:
Mount Rainier National Park
55210 238th Avenue East
Ashford, WA 98304

North Cascades National Park Service Complex
810 State Route 20
Sedro-Woolley, WA 98284

EXPERIENCE YOUR AMERICA

# Appendix A: Biological Assessment - Restoration of Fishers to Mount Rainier National Park and North Cascades National Park Complex

## INTRODUCTION

The National Park Service (NPS) is joint lead with the Washington Department of Fish and Wildlife (WDFW) on a *Fisher Restoration Plan / Environmental Assessment* (Plan/EA) that proposes to restore fishers (*Pekania pennanti*) to the Cascade Range in Washington State. Several proposed release sites are located within Mount Rainier National Park (MORA) and North Cascades National Park Complex (NOCA). In compliance with Section 7 of the Endangered Species Act (ESA), this Biological Assessment (BA) has been prepared to address potential effects of the proposed fisher restoration project (as described in the Plan/EA, Alternative B) to federally listed threatened, endangered, and candidate species and to help make the determination of whether the proposed project is likely to adversely affect listed species or critical habitat.

Included in this BA is a brief description of the proposed project and project area. This BA focuses on an analysis of the potential impacts of the proposed project on listed species previously identified in informal consultation discussions with the U.S. Fish and Wildlife Service (USFWS) as needing detailed evaluation in the BA.

## FEDERAL ACTION

The ESA requires federal agencies to consult with the USFWS on actions that have the potential to affect federally listed species or their designated critical habitat. The federal action that necessitates consultation with the USFWS is the proposed release of fishers into MORA and NOCA and the subsequent re-establishment of a viable, self-sustaining fisher population on federal lands in the Washington Cascades. The NPS is the lead federal agency for the project and is partnering with the Washington Department of Fish and Wildlife.

## BACKGROUND INFORMATION

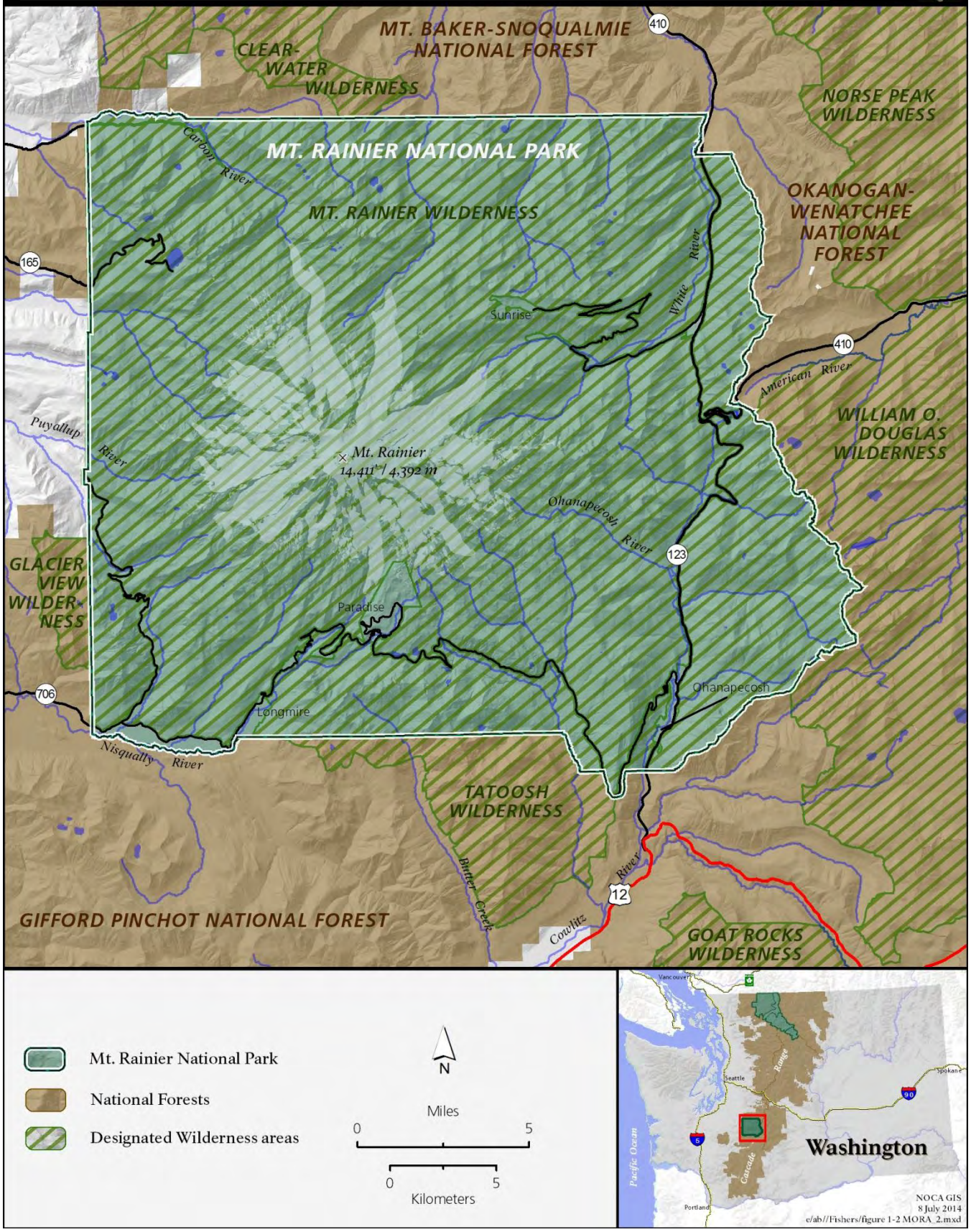
### Mount Rainier National Park

Mount Rainier National Park is composed of approximately 956.6 $km^2$ in west central Washington, on the western slope of the Cascade Range (Figure 1). The elevations of the park range from about 426.7 m above sea level at the Tahoma Woods Administrative Site to 4,392 m at the summit of Mount Rainier. The focal point of the park is the towering, snow and ice-covered volcano, a prominent landmark in the Pacific Northwest. The base of the volcano spreads over an area of about 260 $km^2$. Mount Rainier is the second most seismically active and most hazardous volcano in the Cascade Range. The topography of the park is rugged and precipitous, consisting mainly of peaks and valleys. The Carbon, Mowich, White, West Fork White, Nisqually, South Puyallup, and North Puyallup rivers and their tributaries carry water from Mount Rainier to the Puget Sound. The Ohanapecosh flows into the Cowlitz River before exiting the park enroute to the Columbia River.

Forests blanket the lower elevations of Mount Rainier's flanks, occupying about 58 percent of the park. The forests of MORA occur in three identified life zones—the western hemlock zone, pacific silver fir zone, and mountain hemlock zone. The western hemlock zone has a temperate climate and

**Figure 1: Mount Rainier National Park**

Biological Assessment for Fisher Restoration Plan/Environmental Assessment



occurs at low elevations (610 to 915 m). The dominant trees in this zone are very old (700 to 1,000 years) Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and red cedar (*Thuja plicata*). Other features of this zone include a well-developed multilayered canopy with numerous snags and heavy accumulations of woody debris, including large logs. Understory species include dwarf oregongrape (*Berberis nervosa*), swordfern (*Polystichum munitum*), devil's club (*Oplopanax horridus*), Oregon oxalis (*Oxalis oregana*), foamflower (*Tiarella trifoliata*), western oakfern (*Gymnocarpium dryopteris*), salal (*Gaultheria shallon*), red alder (*Alnus rubra*), skunk cabbage (*Lysichiton americanus*), lady fern (*Athyrium* sp.), Alaska blueberry (*Vaccinium alaskaense*), and beargrass (*Xerophyllum tenax*).

The pacific silver fir zone occurs at middle elevations (915 to 1280 m). This zone has a montane climate with moderate snow accumulations. The dominant vegetation is silver fir (*Abies amabilis*) with a well-developed shrub layer of huckleberry species (*Vaccinium* sp.). Noble fir (*Abies procera*) is a co-dominant species in this zone with some yellow cedar (*Chamaecyparis nootkatensis*). Understory species include big huckleberry (*Vaccinium membranaceum*), Alaska blueberry (*Vaccinium ovalifolium*), and slide alder (*Alnus sinuata*). The mountain hemlock zone occurs at high elevations (1280 to 1676 m). The mountain hemlock zone has cold weather and is influenced by heavy snow accumulations. The vegetation in this zone is subalpine parkland, which is a mosaic of meadows with scattered tree islands. The dominant tree species are subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*). Other species include big huckleberry (*Vaccinium membranaceum*), beargrass, and blueleaf huckleberry (*Vaccinium deliciosum*).

An estimated 170 species of birds, 60 mammals, 15 amphibians, eight native fish, and five reptiles inhabit MORA. A key wildlife resource in the park is the assemblage of species that depend on old-growth coniferous forests for all or some of their habitat requirements. These forests were also historically occupied by fishers in MORA. Therefore, this section focuses on those birds, mammals, and reptiles that occur in these habitats and that may be affected by fisher restoration at MORA. Amphibians, fish, and fish habitat are not discussed because they are unlikely to be affected by fisher restoration.

Birds prevalent in MORA include the common raven (*Corvus corax*), varied thrush (*Ixoreus naevius*), winter wren (*Troglodytes troglodytes*), Steller's jay (*Cyanocitta stelleri*), gray jay (*Perisoreus canadensis*), dusky grouse (*Dendragapus obscurus*), and a variety of warblers, woodpeckers, kinglets, and sparrows. The sharp-shinned hawk (*Accipiter striatus*) and Cooper's hawk (*Accipiter cooperii*) are two common raptors that occur in the forests of the park and may compete with fishers. Other less common raptors include the goshawk (*Accipiter gentilis*), golden eagle (*Aquila chrysaetos),* and northern spotted owl (*Strix occidentalis caurina*). The park also contains barred owl (*Strix varia*) which is increasing in abundance in the park (Bagnall 2013).

Common mammals in the park include elk (*Cervus elaphus*), black-tailed deer (*Odocoileus hemionus*), mountain goat (*Oreamnos americanus*), black bear (*Ursus americanus*), shrews (*Sorex* spp.), chipmunk (*Eutamias* spp.), Douglas' squirrel (*Tamiasciurus douglasi*), golden-mantled ground squirrel (*Spermopholis lateralis*), voles (*Microtus/Clethrionomys* spp.), bushy tailed woodrats (*Neotoma cinerea*), mice (*Peromyscus* spp.), mountain beaver (*Aplodontia rufa*), and snowshoe hares (*Lepus americanus*). More elusive mammals include the mountain lion (*Puma concolor*), bobcat (*Lynx rufus*), Cascade red fox (*Vulpes vulpes cascadensis*), coyote (*Canis latrans*), river otter (*Lutra canadensis*), mink (*Mustela vison*), and spotted skunk (*Spilogale gracilis*). Missing from the park are the large predators, grizzly bear (*Ursus arctos*), gray wolf (*Canis lupus*), as well as lynx (*Lynx canadensis*), wolverine (*Gulo gulo*), and fisher, all of which are considered extirpated.

Reptiles found in the park include one lizard species, the northern alligator lizard (*Elgaria coerulea*), and four species of snakes: the common garter (*Thamnophis sirtalis*), northwestern garter (*Thamnophis ordinoides*), western terrestrial garter (*Thamnophis elegans)* and rubber boa (*Charina bottae*).

The park, of which approximately 97 percent is designated wilderness, is surrounded by a complex network of lands ownerships. Lands adjacent to MORA are comprised of private lands (13 percent), USFS lands (54 percent; non-wilderness) and USFS Wilderness (33 percent).

## North Cascades National Park Complex

North Cascades National Park Complex (NOCA) encompasses approximately 2,768.2 $km^2$ located in northwestern Washington State and is composed of three management units: North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Recreation Area (Figure 2). Approximately 93 percent of this area is managed as designated wilderness. Surrounding the park complex on the west, south and east are 19,000 $km^2$ of national forest lands, of which 7,638 $km^2$ are designated wilderness, most of which are contiguous to the park. NOCA's northern boundary is the international border with the Canadian province of British Columbia, where the area adjacent to NOCA is managed as provincial forest, recreation area, and protected park lands.

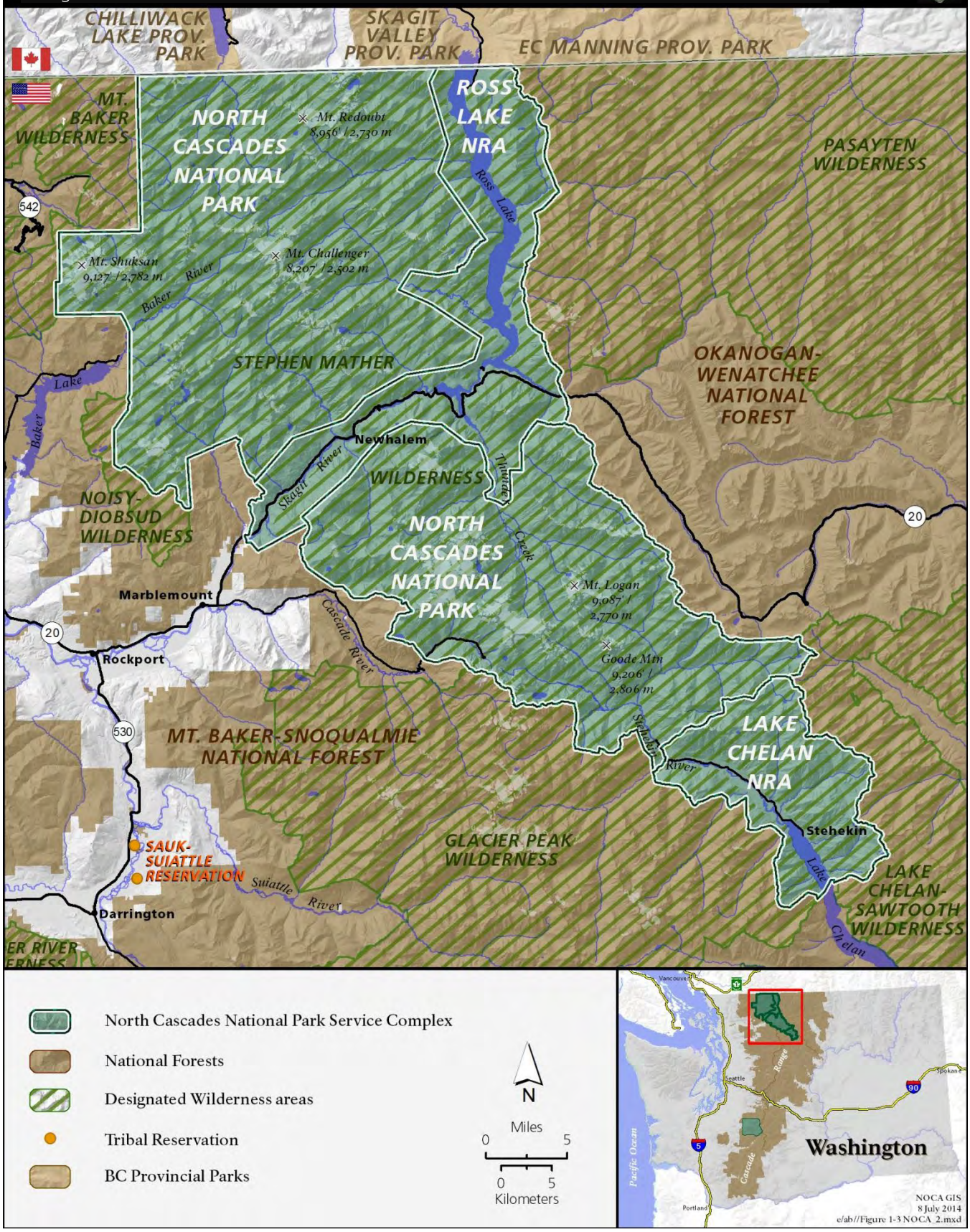
Westerly trending weather patterns, combined with over 2,740 m of topographic relief in the North Cascades, have created distinct east-west and mid-divide precipitation patterns in NOCA. Precipitation gradients occur along either side of an orographic divide defined by the Picket Range, in the northern portion of the park complex and the Pacific Crest Divide to the south (Sumioka et al. 1998). On the west of this divide, precipitation averages between 203 and 897 cm annually. This region represents a seasonally wet maritime climate where summers are relatively dry and typically cool with the majority of precipitation falling during the mild wet winters. To the east of this divide, precipitation drops to an annual average of 76 cm in the lower elevations of the Stehekin Valley. This region is much more influenced by continental air masses that create conditions consisting of cold snowy winters and warm dry summers.

The orographic divide creates a rain shadow effect to the east of the divide and a climate that is much more influenced by continental air masses. As a result, east-slope conditions consist of cold winters and warm dry summers, with average annual precipitation measuring from 76 cm in the lower Stehekin Valley to 897 cm along the crest (Sumioka et al. 1998). Forested habitat below 1,220 m is dominated by the Douglas-fir cover type with lodgepole pine (*Pinus contorta*) and ponderosa pine (*Pinus ponderosa*) commonly found as significant components, while forests above 1,220 m are dominated by subalpine fir interspersed with western hemlock, mountain hemlock, and Englemann spruce (*Picea engelmannii*) cover types (Agee and Kertis 1986). Although less common, the Pacific silver fir cover type is also found on the east side above 1,220 m, most notably in the Bridge Creek portion of the Stehekin River drainage.

The wide variation of habitat types present in the park results in a diversity of flora and fauna. An estimated 1,630 species of plants, 65 mammals, 192 birds, 19 amphibians and reptiles, 27 freshwater fish, 500 terrestrial insects, and 250 aquatic invertebrates occupy habitats ranging from lowland forests and wetlands to high elevation alpine lakes and meadows. Of greatest importance, for the purpose of this document, are bird, mammal, and reptile species that use low to mid-elevation late successional forests. Vascular plants, amphibians, fish, and fish habitat are not discussed because they are unlikely to be adversely affected by fisher restoration.

**Figure 2: North Cascades National Park Service Complex**

Biological Assessment for Fisher Restoration Plan/Environmental Assessment



Birds that are prevalent in NOCA include the common raven, varied thrush, winter wren, Steller's jay, gray jay, sooty grouse, spruce grouse (*Falcipennis canadensis),* bald eagle (*Haliaeetus leucocephalus* ), and a variety of warblers, woodpeckers, kinglets (*Regulus* spp.), and sparrows. The sharp-shinned hawk and Cooper's hawk are two common raptors that occur in the forests of the park and may compete with fishers. Other less common raptors include the goshawk, golden eagle (*Aquila chrysaetos),* and northern spotted owl. The park also contains barred owl which has recently expanded their geographic range to include the Pacific Northwest.

## PROJECT INFORMATION

The fisher was listed by the state of Washington as an endangered species in 1998 (Lewis and Stinson 1998) and as warranted but precluded for listing as threatened or endangered under the Endangered Species Act by the federal government in 2004 (USFWS 2004). Two major factors contributed to the decline of fishers in Washington: over-exploitation from commercial trapping and loss, degradation, and fragmentation of suitable habitat. Poisoning, predator control, and incidental capture in traps set for other wildlife are also considered contributing factors in the decline of fishers in the state (Lewis and Hayes 2004). Despite protection from legal harvest in Washington since 1934, fishers have not recovered in the state. Extensive surveys throughout Washington, including MORA and NOCA, from 1990 to 2003 failed to detect any fishers (Christophersen et al. 2005, Hayes and Lewis 2006, Reid et al. 2010). Although fisher sightings were reported in the state, no formal scientific surveys detected them and no verifiable evidence (e.g., photo or specimen) was available to confirm their presence. Fishers were therefore considered extirpated from Washington (Aubry and Lewis 2003).

A fisher recovery plan for Washington State was completed in December 2006 (Hayes and Lewis 2006). This plan stated that fishers will be down-listed from "state endangered" to "state threatened" when self-sustaining populations of fishers are established in multiple locations both on the Olympic Peninsula and either the southern or northern Cascades. Fishers will be further down-listed to "state sensitive" status when a second population is established in the Cascades and habitat management plans are in place to provide for the continued viability of fishers.

Reintroduction was considered the key strategy to restore fishers in Washington because of the absence of nearby populations to recolonize the state (Hayes and Lewis 2006). Fishers were successfully reintroduced in ten states and five provinces in North America, including Oregon, Montana, Idaho, and British Columbia. In 2008, WDFW and the NPS initiated the first fisher reintroduction to Washington State (NPS 2007), eventually translocating 90 fishers into Olympic National Park (OLYM) from 2008-2010 (Lewis et al. 2011). Based on WDFW's *Feasibility Assessment for Reintroducing Fishers to Washington* (Lewis and Hayes 2004), the Cascades contain the most suitable fisher habitat in the state following the Olympic Peninsula. Consequently, these lands are considered the most suitable location for the next reintroduction of fishers to the state.

Because reintroductions require the translocation of individuals from a source population, action is needed at this time because opportunities for obtaining fishers from genetically similar source populations are available now, but might decrease in the near future.

The following further define the need for taking action:

1. The fisher, native to the southwestern (SW) and northwestern (NW) Cascades (including MORA and NOCA), has been extirpated from the region since at least the early 1990s and is currently a stated-listed endangered species and federally-listed candidate species (federal listing is for the

West Coast Distinct Population Segment [DPS] of the fisher). This extirpation threatens the overall strength and resiliency of the species and has had a negative impact on the SW and NW Cascades ecosystems.

2. The absence of fisher from MORA and NOCA also diminishes the wilderness character of the Mount Rainier Wilderness and Stephen Mather Wilderness which are located within and managed by these units of the national park system, respectively. This action is needed to help protect the wilderness character of these wilderness areas.
3. The fisher is not expected to return in ecologically meaningful abundance to the SW and NW Cascades without human intervention due to geographic isolation from source populations. As a result, Washington State has determined that fisher reintroduction is necessary and feasible in both the SW and NW Cascades to restore this species to its historical range in the state.
4. MORA and NOCA, who collectively protect approximately 3,725 $km^2$ of land in the heart of the SW and NW Cascades (94 percent of which is designated wilderness), are conservation anchors in the broader Cascades landscape. These NPS lands provide intact and suitable habitat for native species, including the fisher, and serve as a connectivity link between other lands with suitable habitat (NPS 2012).
5. Despite managing a substantial land base in the region, the NPS lacks the ecosystem-wide authority, resources, expertise, and expansive suitable fisher habitat to enable recovery of a self-sustaining fisher population without assistance from WDFW, and WDFW lacks the resources to facilitate fisher recovery in both ecosystems without substantial outside assistance. Considering land management authorities, funding needs, and the complexity of species reintroductions, an ecosystem-based partnership is essential to ensure recovery of this species in both the SW and NW Cascades.
6. Recovery will help both NPS and WDFW achieve their conservation missions and fulfill various agency mandates. Action towards recovery may also preclude federal listing under the ESA. This could conserve scarce federal resources to focus on recovery of other species.
7. Action is needed now because the most suitable source population of fishers for the SW and NW Cascades may no longer be available for translocation/reintroduction, despite current availabilities.
8. The technical expertise and infrastructure that were created during the fisher reintroduction effort at OLYM, including a working relationship with contractors, veterinarians, and trappers in British Columbia, will dissipate as time lapses between reintroductions. The sooner fisher reintroductions can be implemented in the SW and NW Cascades, the more likely these will benefit from that expertise and existing infrastructure.
9. Additional populations of fishers in the Pacific Northwest will help sustain the species in the face of threats such as disease, habitat fragmentation, climate change, or other widespread ecological threats.

The following objectives for fisher restoration at MORA and NOCA were developed for this proposed plan:

1. Establish self-sustaining fisher populations in both the SW and NW Cascades (i.e. populations that are capable of surviving and reproducing by natural means, without human intervention), and thereby contribute to Washington State recovery objectives for the fisher.
2. Establish founding fisher populations genetically similar to the extirpated populations.
3. Facilitate the distribution of fishers throughout suitable habitat in both MORA and NOCA.

4. Expand scientific understanding regarding habitat use, movement, reproduction and survival, and use such information to adaptively manage fisher restoration in the SW and NW Cascades and guide and inform future conservation efforts for fishers.
5. Educate the public about the fisher and restoration efforts, and inspire the public to become more involved in rare species conservation.

## Reintroductions

The NPS and WDFW propose to obtain fishers from a source population in British Columbia that is most closely related to that which historically occurred in the state (Lewis and Hayes (2004), and reintroduce them into the SW and NW Cascades reintroduction areas (including MORA and NOCA; Figure 3). The proposed fisher restoration plan is detailed in the WDFW *Implementation Plan for Reintroducing Fishers to the Washington Cascades* (Lewis 2013). WDFW's Cascades fisher reintroduction plan outlines the release of approximately 160 fishers into the SW and NW Cascades reintroduction areas. These releases would occur over a period of four to eight years, in two stages. The first stage would be the release of ≥80 fishers in the SW Cascades reintroduction area over a two-year period (approximately 40 fishers per year). Each fisher would be equipped with a radio-transmitter with a ≥2-year lifespan. Fishers would be released in years one and two of the project and their movements and behaviors would be monitored using radio-telemetry in years one to three. To meet the founder population objectives, fisher releases would be conducted for a third year if 1) a minimum of 80 fishers is not obtained in years one and two, or 2) fisher survival in years one or two is less than 50 percent. In the event that release efforts are required in year three, WDFW and the NPS would expand fisher monitoring efforts to include a fourth year (years one to four).

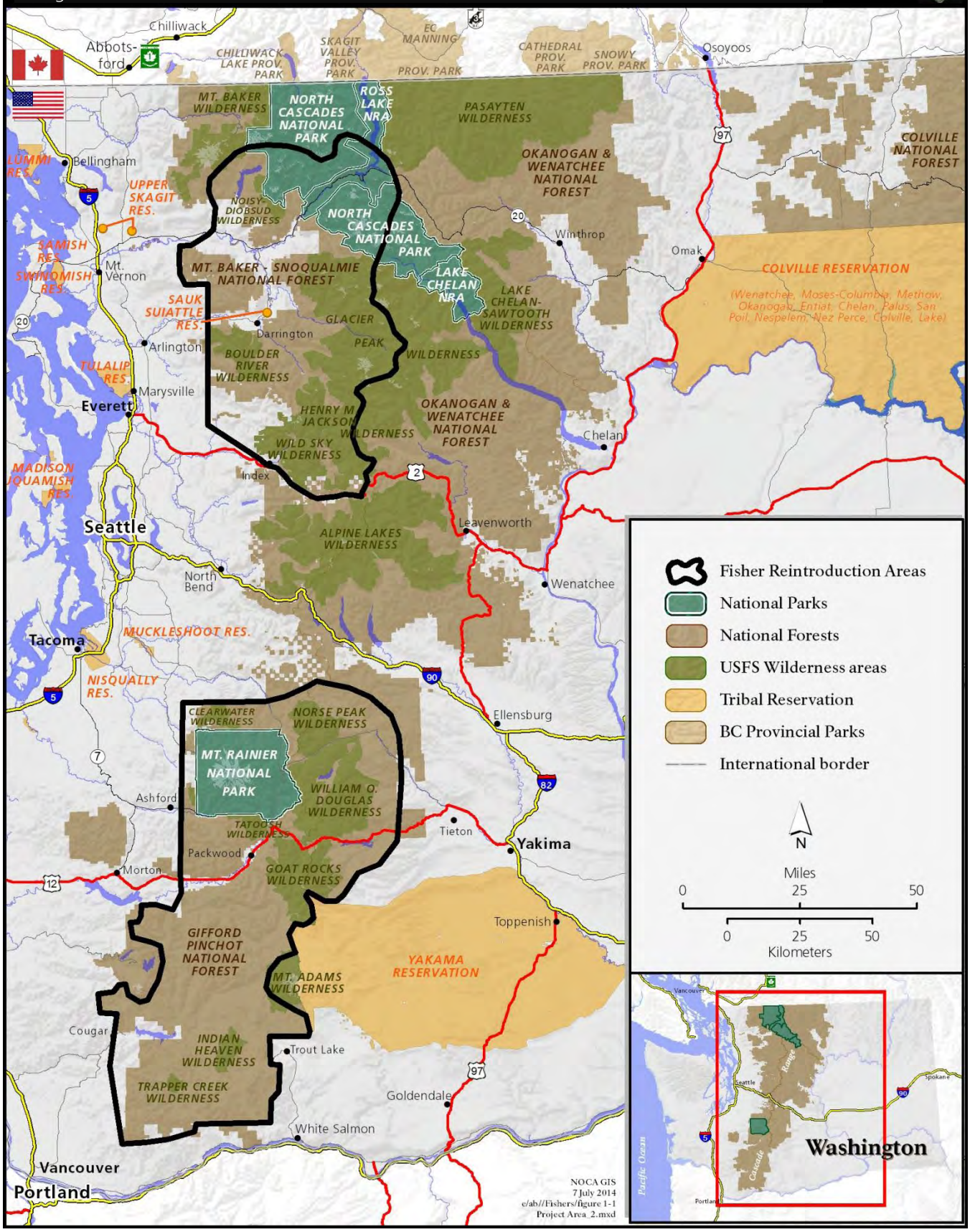
The second stage of the reintroduction would be the release and monitoring of 80 fishers in the NW Cascades reintroduction area, and this second stage would follow the approach and contingencies outlined above for stage one in the SW Cascades reintroduction area. Fishers would not be released in the NW Cascades reintroduction area before the completion of fisher releases in the SW Cascades reintroduction area.

Fishers would be released in male-female pairs or in groups, depending on the number available, with a bias for adults and females. The timing, number, and locations of releases would vary depending on fisher availability, funding, and the findings of monitoring efforts of previously released fishers. There would be an effort to release as many fishers during the fall months (November and December) as possible, rather than in the winter (January and February). Fall releases would allow fishers to acclimate to the reintroduction area before winter, establish home ranges and locate suitable den sites prior to the birthing and mating season (March-May), and become aware of potential mates before the mating season. Likely release scenarios are as follows:

- ***Year 1*** — Release approximately 40 fishers in the fall and winter months, at ≤5 reintroduction sites within the SW Cascades recovery area.
- ***Year 2*** — Adapt the release approach based on monitoring results from year 1 and the availability of fishers from the source population. If no substantial changes are required and fishers are available, release 40 additional fishers in the fall and winter, and release fishers in the same recovery area to maximize survival, occupancy, and population expansion. If fisher availability limits the number that can be released, use monitoring results to determine if releases should occur at sites that did not receive fishers in year 1, or if releases should occur in the same locations as in year 1. Similarly, releases may be shifted to a new reintroduction site if initial survival is low in a reintroduction site used in year 1, or if it is otherwise deemed unsuitable.

**Figure 3: Reintroduction Areas in the SW and NW Cascades**

Biological Assessment for Fisher Restoration Plan/Environmental Assessment



- *Year 3* — Following successful methodology developed in years 1 and 2, release 40 additional fishers in the fall and winter at ≤5 sites in the NW Cascades reintroduction area.
- *Year 4* – Release 40 fishers in the NW Cascades reintroduction area as in Year 2.
- *Year 5* – Monitor fishers released in Year 4.

## Note on No Action Alternative

Under the No Action Alternative, fishers would not be reintroduced into the two parks. However, WDFW would proceed with reintroducing fishers into the SW Cascades reintroduction area south of MORA without NPS involvement. All the candidate release sites included in WDFW's *Implementation Plan for Reintroducing Fishers to the Washington Cascades* for the SW Cascades reintroduction area are within the maximum movement distances recorded during the Olympic National Park reintroduction (up to 114 km, Lewis et al. 2010). The nearest candidate release sites (Sites 3 and 4) are only 25-30 km from park boundaries (Figure 4). It is predicted that fishers from the WDFW reintroduction effort would eventually recolonize suitable habitat in MORA even without NPS participation. It is not known when fishers would reach MORA. Although MORA contains high quality fisher habitat, the southern parts of the SW Cascades reintroduction area (south of State Highway 12) contain larger blocks of contiguous habitat away from highways and the distance between these areas and MORA may delay the occupancy of fishers in MORA. Highway 12 may also act as a substantial impediment to dispersal, due to either behavioral avoidance or mortalities associated with vehicle collisions. Although single fishers may immigrate into MORA shortly after a release outside park boundaries, the establishment of a persistent fisher presence in MORA would likely occur at a slower rate under the No Action Alternative.

## Reintroduction Areas

As stated previously, the *Feasibility Assessment for Reintroducing Fishers to Washington* identified two areas suitable for reintroducing fishers in the Washington Cascades: the SW Cascades and NW Cascades (Figs. 4 and 5). The selection of reintroduction areas was based on three primary considerations; reintroduction areas must be 1) large areas dominated by federal land ownership, 2) areas with large amounts and dense concentrations of high-quality habitat (Lewis and Hayes 2004), and 3) areas that include few large highway corridors. The SW and NW Cascades reintroduction areas were chosen because they met these criteria and were deemed capable of supporting self-sustaining populations of fishers.

The *Implementation Plan for Reintroducing Fishers to the Washington Cascades* identified nine candidate release sites in the SW Cascades reintroduction area and six release sites in the NW Cascades reintroduction area (Lewis 2013). The NPS added another candidate release site within the NW Cascades in the Plan/EA. Candidate release sites were selected to allow the release of fishers in interior portions of a reintroduction area that are 1) dominated by suitable habitat, 2) more than ten kilometers away from highway corridors (with few exceptions), and 3) accessible by vehicle during all or part of the release season (November to February). Two of the candidate release sites in the SW Cascades reintroduction area are located in MORA, the upper Nisqually River (Site 1, Fig. 4) and upper Ohanapecosh River (Site 2, Fig. 4); and three of the candidate release sites in the NW Cascades reintroduction area are located in NOCA, the middle Skagit/lower Ross Lake National Recreation Area (Site 2, Fig. 5) the north fork of the Cascade River (Site 3, Fig. 5), and Ross Lake and the Big Beaver Drainage (Site 1, Fig. 5).

**Figure 4: Southwestern Cascades Reintroduction Area**

Biological Assessment for Fisher Restoration Plan/Environmental Assessment

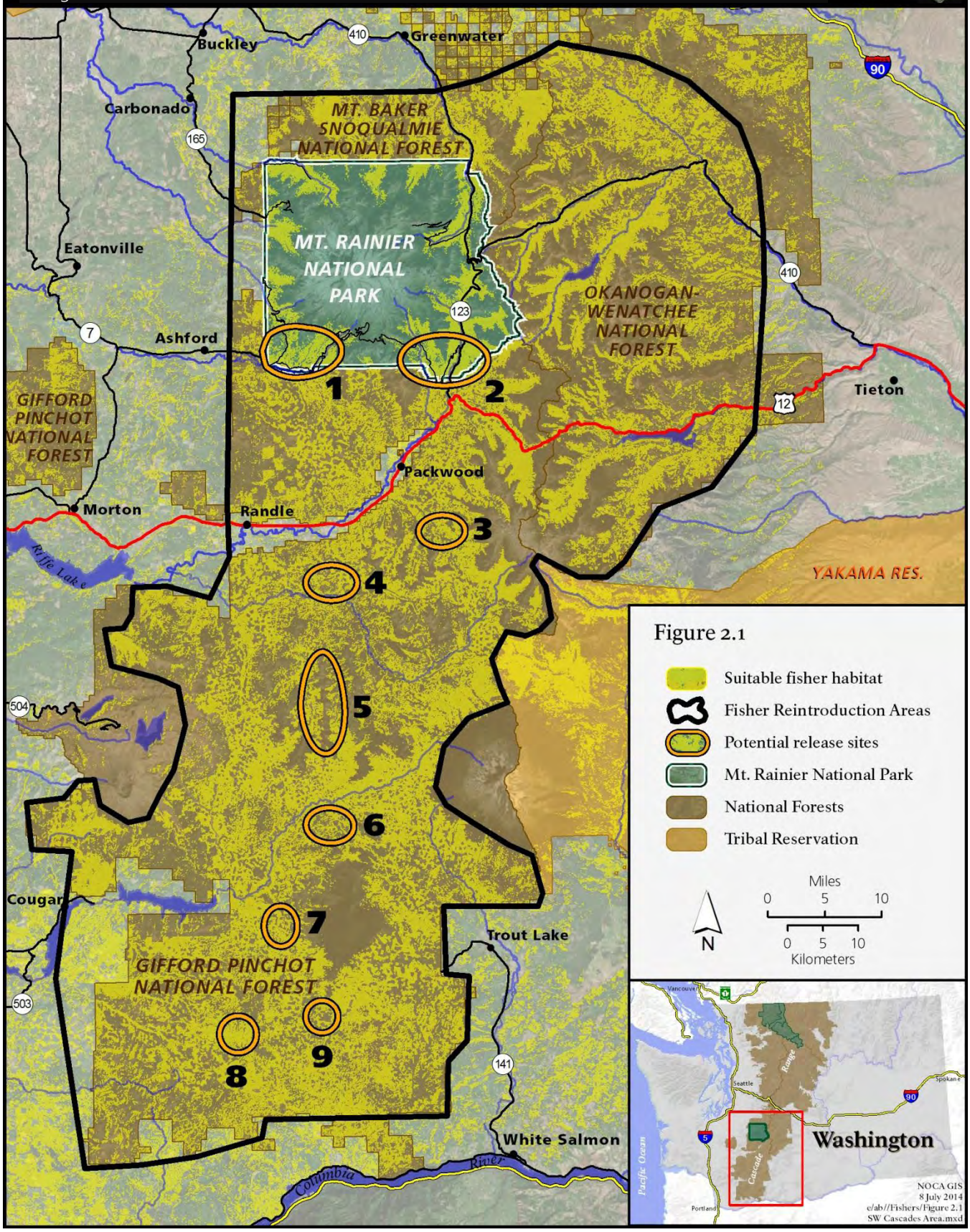
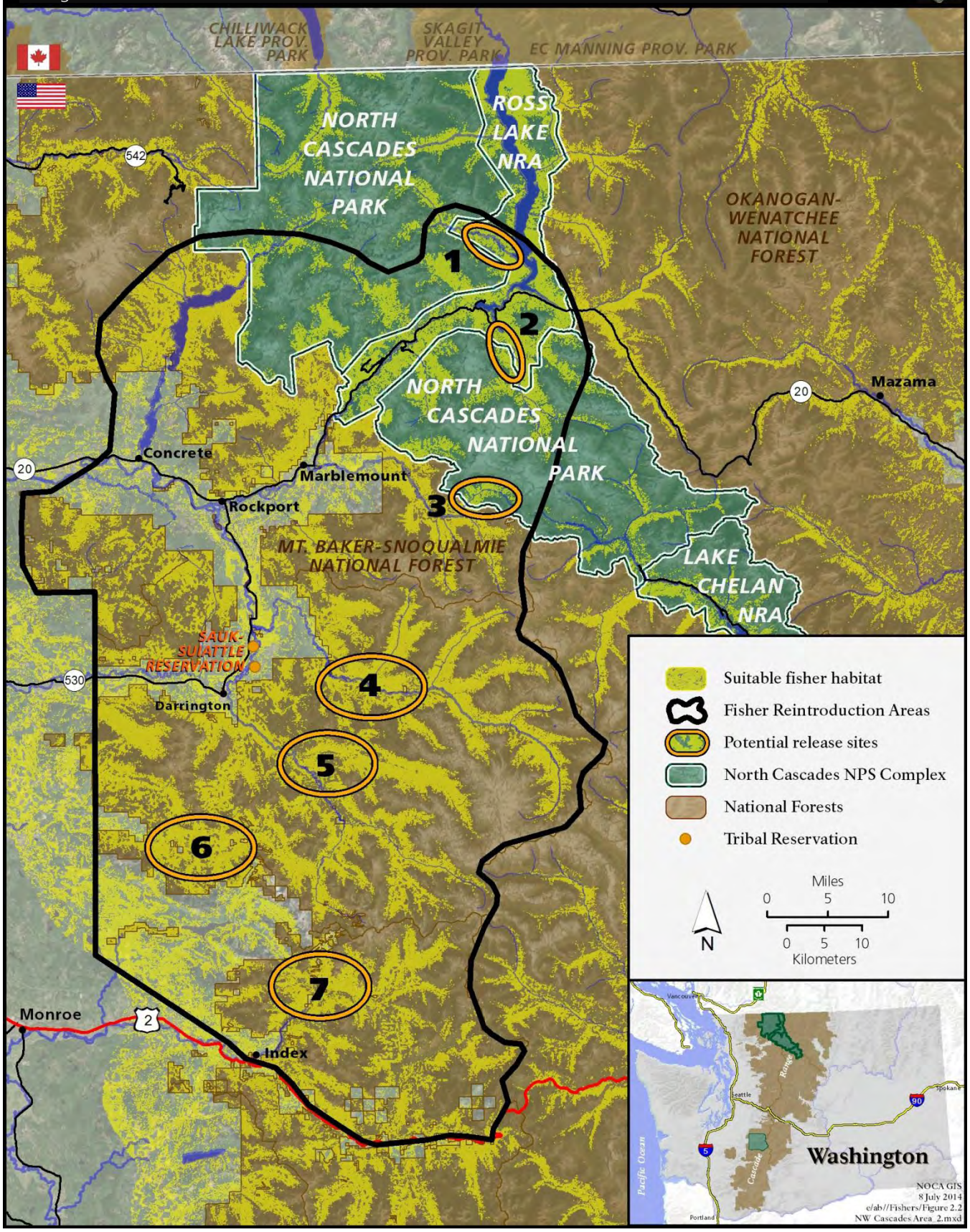


**Figure 5: Northwestern Cascades Reintroduction Area**

Biological Assessment for Fisher Restoration Plan/Environmental Assessment



### SW Cascades Reintroduction Area and Candidate Release Sites in MORA

The SW Cascades reintroduction area contains large landscapes dominated by high-quality fisher habitat. Because this area is less dissected by high-elevation ridges as compared to the NW Cascades area, it contains larger expanses of continuous, high-quality habitats for fishers. The SW reintroduction area was the highest ranking reintroduction area in the Cascades ecosystem (Lewis and Hayes 2004) and is expected to support a large, self-sustaining population of fishers that may ultimately provide dispersers to other suitable areas within the region. Of the nine candidate release sites identified in WDFW's *Implementation Plan for Reintroducing Fishers to the Washington Cascades,* two are located in MORA. These two areas were evaluated in the field by the WDFW and NPS Project Managers, and specific release sites were identified which best met the criteria listed above.

#### *Nisqually River*

The Nisqually River corridor within MORA contains high quality fisher habitat consisting of mature forest with a complex structure, with substantial large woody debris. The road between the Nisqually Entrance and Paradise is open to vehicle traffic year-round, and constitutes the only road in MORA maintained in the winter. The Longmire Campground, across the Nisqually River from the NPS administrative area of Longmire, was chosen as a potential release site due primarily to its easy access in the winter. The NPS maintains a water treatment plant there, and so the road through the campground is kept open for access during the winter.

#### *Ohanapecosh River*

The Ohanapecosh River corridor within MORA also contains high quality fisher habitat consisting of mature forest with a complex structure, with substantial large woody debris. Although Highway 123, which parallels the Ohanapecosh River, is closed in the winter within MORA, Washington Department of Transportation keeps the highway open to the NPS boundary. A site visit confirmed the feasibility of releasing fishers on NPS lands a short distance into the park by carrying the release boxes into the park on foot.

### NW Cascades Reintroduction Area and Candidate Release Sites in NOCA

The NW Cascades reintroduction area contains large landscapes dominated by high-quality fisher habitat. Much of this habitat occurs in the low and mid-elevation landscapes of river drainages and is distributed in a dendritic pattern across the reintroduction area because these habitats are separated by high-elevation ridges and mountains that characterize the North Cascades ecosystem. The NW Cascades area ranked third among the three areas identified as suitable for successfully reintroducing fishers in western Washington (after the Olympic and SW Cascades reintroduction areas; Lewis and Hayes 2004). Despite its lower ranking, the NW Cascades area is expected to support a relatively large, self-sustaining population of fishers that may ultimately provide dispersers to other suitable areas within the region. Six candidate release-sites were identified by WDFW within the interior of the reintroduction area, two of which are located in NOCA. One additional potential release site was added by the NPS after further review.

#### *Middle Skagit/Thunder Creek Drainage*

The Skagit River corridor within NOCA, particularly within the Thunder Creek drainage and side drainages, contains high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. This area is easily accessible from the Colonial Creek Campground and State Route 20, which is open and maintained by the Washington State Department of Transportation through milepost 134, just past Colonial Creek Campground and Thunder Creek, over the winter.

### *North Fork of the Cascade River*

The North Fork of the Cascade River within NOCA also contains high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. This potential release site is accessed off the Cascade River Road which is typically closed at the Eldorado trailhead, just inside the park boundary, during the winter. Vehicular access above this point is uncertain over the winter due to snowfall, but it would be possible to carry the transport boxes into the park on foot from the closure gate, which is approximately five kilometers from the Cascade Pass Parking Lot.

### *Ross Lake and Big Beaver Creek Drainage*

Although not specified in the *Implementation Plan for Reintroducing Fishers to the Washington Cascades,* the shores of Ross Lake and the Big Beaver Creek drainage also contain high quality fisher habitat consisting of mature forest with a complex structure and substantial large woody debris. These areas are accessible by boat year-round, via Diablo Lake and the Ross Dam haul road.

## Monitoring

The goal of restoration monitoring is to determine the success of the effort and guide the adaptive management process. Monitoring would involve tracking as many released individuals as possible and would start at the time of their release. Monitoring would continue until it is clearly demonstrated that a self-sustaining population has been established, until it is determined that no further monitoring is needed because the reintroduction has failed, or until it is no longer possible due to a lack of support or funding.

Monitoring in reintroduction areas would be conducted in two phases. Phase 1 would involve the monitoring of radio-transmittered fishers using radio telemetry. Phase 1 monitoring would begin as soon as fishers are released in the first two years in a reintroduction area, and would continue until year three, when transmitters on fishers released in year 2 reach their expected lifespan. At the end of this three-year period, the reintroduction would be considered initially successful if there is evidence of a reproductive population within the reintroduction area as indicated by 1) home range establishment by at least 50 percent of fishers that survive until the fall of their first year following release and 2) documented reproduction by one or more females in years two and three in the reintroduction area. Phase 1 monitoring would be extended to a fourth year if fisher releases are necessary in a third year to meet founder population objectives.

Phase 2 of the monitoring program is designed to evaluate the long-term success of the reintroductions. With adequate funding, phase 2 monitoring would be conducted between years five and ten following the first releases in a reintroduction area. Phase 2 monitoring would determine the distribution and abundance of fishers across reintroduction areas. It would involve a multi-year deployment of a sampling grid of hair-snare and remote-camera stations across areas where fishers may have become established within or outside the Cascades Recovery Area, following the methodology described by Jenkins and Happe (2013).

At present, several tools and methodologies are planned to be used to monitor released fishers and their offspring in the two parks.

***Radio-telemetry :*** Telemetry would be the main tool to monitor fishers during the reintroduction. Due to logistical constraints (e.g., few roads, wilderness, and dissected topography) the majority of relocations of released animals would be gathered via aerial telemetry using small fixed-winged aircraft (flying at least 111 yards above the tree canopy). Animals would be relocated from the air up to five

times per month, weather permitting. If some animals establish territories in areas containing roads or trails, more frequent relocations may be gathered from the ground. Data collected via telemetry flights will be used to assess fisher survival rates, dispersal, home range establishment, and resource selection at the home range scale.

Beginning in February, emphasis would be placed on tracking reproductive-age (or known pregnant) females until their reproductive status was determined. Where access allowed, den sites would be investigated on foot to confirm reproduction. If a mortality signal is received, attempts would be made to promptly retrieve the animal to determine cause of death. Carcass retrievals would be via foot access.

***Diet analysis:*** For animals that can be radio-tracked on the ground, scats at den and rest sites would be gathered for subsequent food habits analysis.

***Genetic sampling:*** Prior to release, tissue and blood samples would be collected from all fishers to obtain genotype information and evaluate for disease exposure. During Phase 2 monitoring (years five to ten of the project), an array of hair snaring devices and camera stations would be deployed to 1) monitor the dispersal and habitat occupancy patterns of the recovering fisher population, 2) confirm live status of released animals after the batteries of radio transmitters expire, and 3) detect reproduction and the recruitment of young into the population. This genetic sampling would be used to detect successful breeding and recruitment and may also provide an estimate of population size. Genetic sampling efforts would require access to portions of the reintroduction areas by vehicle or foot (no funding source has yet been identified for this portion of the monitoring program).

## FISHER BIOLOGY

The fisher is a large, stocky, dark brown member of the weasel family, about the same size as a house cat. Males weigh about twice as much as females (adult males: 3.5-5.5 kg; adult females: 2.0-3.0 kg) and males are about 20 percent longer than females (males: 90-120 cm; females: 70-95 cm; total length) (Douglas and Strickland 1987). Fishers at the northern extent of their range in western North America are larger (mean weights are 4.8kg for males and 2.6 kg for females in British Columbia; Weir 2003) than those at the southern extent of the range (mean weights are 3.2 kg for males and 1.9 kg for females in southern Sierra Nevada; Truex et al. 1998). Fishers have partially retractable claws that allow them to climb and move through trees, and descend in a head-first position (Powell 1980, 1993).

Fishers are solitary animals (Powell 1993). They interact with other fishers during breeding, kit-rearing and defense of territory. Most studies report that fishers exhibit intrasexual territoriality: male home ranges typically overlap with multiple female home ranges (Powell 1993, Powell and Zielinski 1994, Weir 2003). Based on estimates from radio-telemetry studies conducted in the western North America, male fishers have an average annual home range of approximately 48 $km^2$, whereas average home range size for female fishers is smaller, at 18 $km^2$ (Lofroth et al. 2010). For fishers released at OLYM, Lewis (2014) calculated much larger home ranges: 128 $km^2$ for males, and 63 $km^2$ for females.

Fishers breed during late winter or early spring but, due to delayed implantation, do not give birth until approximately one year later in late March and April (Powell 1993, Frost and Krohn 1997, Frost et al. 1997). Female fishers mate within about ten days following parturition, thus adult females may be pregnant most of the time (Hodgson 1937, Hall 1942, Powell 1993).

Fishers have relatively low reproductive rates. Litter size of female fishers in captivity ranges from one to four kits with an average of 2.7 per litter (York 1996, Truex et al. 1998, Aubry and Raley 2006). In wild fisher populations, litter size appears to be smaller (typically one to three kits with an average of about

2.2 kits per litter) (Lewis and Hayes 2004). However two of the three fishers that were confirmed to have bred and denned on the Olympic recovery area had litter sizes of four. Female fishers can breed at one year of age (Hall 1942, Wright and Coulter 1967, Powell 1993) but due to delayed implantation will not give birth to kits until they are two years old. Additionally, not all adult females (≥1 year of age) in a given population give birth to kits every year. Except for recent data from a fisher study in northern California, most studies have found that the average annual reproductive rate of adult females was 46 – 68 percent (Lewis and Hayes 2004). Furthermore, there is evidence to indicate male fishers may not become effective breeders until two years of age (Wright and Coulter 1967, Douglas and Strickland 1987, Frost et al. 1997).

Female fishers give birth to kits in tree cavities (Leonard 1980, Paragi 1990, Paragi et al. 1996) that tend to be elevated well above the ground (Buck et al. 1983, Weir 1995, Truex et al. 1998, Higley and Matthews 2006). Average den heights have been reported as 10.6 m above the ground in California (Buck et al. 1983) and 16.2 m in Oregon (Aubry and Raley 2006). Fisher kits are altricial (Hall 1942, Coulter 1966, Powell 1993). Their eyes and ear canals open at about seven to eight weeks, and shortly thereafter the mother begins bringing them solid food (Coulter 1966, Powell 1993). In the wild, fisher kits at three to four months of age were observed to be still learning to climb trees and handle prey that the adult female had captured (Aubry and Raley 2006). Fisher kits appear to stay within their mother's home range through their first fall and early winter before dispersing (Paragi 1990, Aubry and Raley 2006).

The primary fisher denning period (from birth to weaning) lasts about ten weeks and researchers have found that females with kits may use more than one tree cavity during that time (Arthur and Krohn 1991, Paragi et al. 1996, Truex et al. 1998, Aubry and Raley 2006, Higley and Matthews 2006). After the primary denning period, adult females with kits become more mobile but may still use cavities in various types of structures (e.g., live and dead trees, hollow logs) for prolonged periods of time (over two days; Truex et al. 1998, Aubry and Raley 2006, Higley and Matthews 2006, Weir 2006). One fisher den in OLYM was a mountain beaver burrow system.

The upper limit of life expectancy for fishers is generally believed to be about ten years of age (Powell 1993), however a fisher in British Columbia was 12 years old when trapped (Weir 2003). Limited data indicate that even though trapping is light or non-existent in west coast populations, fisher survival rates are lower in west coast populations than in the east coast populations. In California, survival of adult male and female fishers from untrapped populations ranged from 61.2 to 83.8 percent for adult females, and 73.3 to 85.5 percent for adult males (Truex et al. 1998). Survival estimates from recently reported studies in the southern Oregon Cascades and northern California are consistent with those from Truex et al. (1998) (Aubry and Raley 2006, Higley and Mathews 2006). In Williston, British Columbia where light trapping pressure continues, non-juvenile fisher survival averaged 71.1 percent over four years of study (Weir 2005). Although predation on fishers is recorded as a cause of death in the east (York 1996, Krohn et al. 1997), it appears to be a less significant source of mortality in east coast versus (Douglas and Strickland 1987) west coast populations. Predation of wild fishers is generally determined through necropsies that evaluate puncture wounds, wounding patterns, and other evidence found at the site. Predation on fishers by cougars, coyotes, lynx, bobcats, wolverines (*Gulo gulo*), and raptors (Buck et al. 1983, Truex et al. 1998, Higley and Mathews 2006, Weir 2006, Wengert 2013) have been reported. Weir et al. (2005) found fisher hair, claws, and bone in fisher stomach contents during analysis but did not conclude whether or not this was due to predation or scavenging. In the Cascades recovery area, wolves, grizzly bear, wolverine, cougars, bobcats, coyotes, and large raptors are potential predators of reintroduced fishers.

## Distribution and Habitat Use Patterns

On the west coast, fishers remain in only five areas: northern and central British Columbia, the southern Oregon Cascades, southwestern Oregon/northwestern California, the southern Sierra Nevada of California, and the recent reintroduction in the Olympic Peninsula of Washington (Lewis et al. 2012). Throughout the west coast, fishers are associated with low to mid elevations coniferous or mixed deciduous-coniferous forests (Lofroth et al. 2010, Raley et al. 2012). Fishers are generally confined to areas that do not have deep, soft snow, and therefore tend not to inhabit alpine areas, especially in winter. Krohn et al. (1995) determined that fishers in California were primarily limited to areas with less than 9 inches of snow per winter month. Fishers may travel through alpine areas during the mating season, when dispersing or during summer, but in general their activities are concentrated in lower-elevation forests, which provide sufficient cover, rest and den sites, and food sources (Raley et al. 2012). Fishers from the OLYM reintroduction used elevations up to 1,424 m.

Fishers use rest sites between periods of activity. Rest sites are generally used for only a single resting or a sleeping bout; however, the same site may be used for many days when weather is severe or a large food item has been cached nearby. Rest structures used by west coast fishers include: cavities in snags, piles of cull logs, mistletoe and rust brooms, large lateral limbs and limb clusters in the canopies of live trees, rodent or raptor nests, and ground burrows (see review by Lofroth et al. 2010). Rest sites are often in large diameter trees that are usually the largest and tallest in the immediate area (Buck et al. 1983, Seglund 1995, Weir 1995, Zielinski et al. 2004). During six years of study in the southern Oregon Cascades, Aubry and Raley (2006) located 641 fisher rest structures. Of the female and male rest sites, 60 percent and 71 percent, respectively, were in live trees, 20 percent and six percent were in snags, and 20 percent and 23 percent were on logs, cull piles, or other ground sites. Over 65 percent of the rest site structures in live trees were in mistletoe brooms. Few researchers report height of rest sites; however, in the southern Oregon Cascades, the heights of 172 fisher rest sites in live trees were observed and mean rest site height was 12.2 m (C. Raley, U.S. Forest Service, pers. comm.). In northern California mean fisher rest site height were ten meters (range 1-26) in hardwoods and 17 m (range 2-43) in conifers, while mean tree height was 17 m (range 3-35m) for hardwoods and 34 m (range 5-61m) for conifers (M. Higley, Hoopa Tribal Forestry and S. Yaeger, USFWS, pers. comm.).

Because forest associations vary widely throughout the region, there is no single forest type that fishers are associated with. Instead, it appears that they can inhabit a variety of forest types, with the caveat that those forests provide key habitat features that fishers require: canopy cover (usually >50 percent); large trees with cavities sufficiently large enough to provide denning sites; and large limbs, snags, and logs for resting sites (Lofroth et al. 2010, Raley et al. 2012). Because it takes time for those structures to develop, fishers are often associated with late-successional forests. In many parts of their range, fishers use deciduous trees for denning and resting; however these trees are not required as fishers occur in areas where deciduous trees are absent. Deciduous trees may be used more frequently because they have a higher incidence of suitable cavities than the surrounding conifers.

## Fisher Food Habits and Foraging Strategy

Although they are agile climbers, and occasionally hunt in trees, extensive snow tracking bouts have revealed that fishers primarily forage on the ground (Coulter 1966, Powell 1980, 1981, 1993, Raine 1987). Fishers are opportunistic, solitary hunters, often hunting by investigating cover in a zig-zig pattern (Powell 1993).

In western North America, the fisher is a dietary generalist in that it will eat a variety of prey and food items (Table 1). Fishers consume a variety of small and mid-sized mammals as well as birds, insects,

reptiles, and plant materials. They rarely eat amphibians. Their consumption of ungulate carrion is widely reported, especially in winter (Table 2). The majority of food items consumed by fishers are ground-dwelling species (Table 1). The proportion of these foods in the diet varies across study areas (Tables 1 and 2), and can vary across seasons within a study area, presumably in response to availability (Zielinski et al. 1999). Although fishers can use a variety of prey, small and mid-sized mammals are the dominant components of the diet in the Pacific states, exceeding 70 percent frequency of occurrence across studies in the Pacific states (Table 2). Winter studies conducted in Idaho (Jones 1991), Montana (Roy 1991), and British Columbia (Weir et al. 2005) reported almost exclusive use of mammals by fishers (Table 2).

**Table 1. Percent frequency of occurrence of major taxa groups and prey items in the fisher diet based on three food habits studies conducted in the west coast.**

| Prey | Southern Oregon Cascades[1] | Northern California[2] | Southern Sierra Nevada[3] |
|---|---|---|---|
| Mammals | 82.6 | 93.0 | 78.6 |
| Insectivora (shrews, moles) | 5.2 | 20.9 | 4.5 |
| Lagomorpha (rabbits, hares) | 22.7 | 4.1 | 0.5 |
| Rodentia (squirrels, mice, voles) | 40.8 | 49.7 | 47.8 |
| Carnivora (mustelids, canids) | 2.6 | 22.4 | 21.4 |
| Artiodactyla (deer, elk) | 8.5 | 20.9 | 4.0 |
| Birds | 28.2 | 26.0 | 39.8 |
| Reptiles | 6.5 | 24.5 | 20.4 |
| Amphibians | | 2.1 | |
| Insects | 25.6 | 55.2 | 55.7 |

1 Aubry and Raley (2006), analysis of n = 387 fisher scats from males and females combined, across all seasons.
2 Golightly et al (2006), analysis of n = 388 fisher scats from males and females combined, across all seasons. Fisher scats were collected from four study areas within the Klamath bioregion of northwestern California.
3 Zielinski et al. (1999), analysis of n = 201 fisher scats from males and females combined, across all seasons.

**Table 2. Dominant prey/food items identified in the fisher diet in western North America.**

| Study | Study Location | Dominant Prey Items Identified (percent frequency of occurrence) |
|---|---|---|
| Weir et al. (2005) (analysis of 215 stomachs) | British Columbia | Snowshoe hare (39.1), red squirrel (33.5), red-backed vole (23.3), porcupine (19.5) |
| Roy (1991) (analysis of 80 scats) | Northwestern Montana | Snowshoe hare (49), *Peromyscus* spp. (14),woodrat (7), *Martes* spp. (7) |
| Jones (1991) (analysis of 7 G-I tracts) | Northcentral Idaho | Ungulate (>30) snowshoe hare (28.6), redbacked vole (28.6), beaver (28.6) |
| Jones (1991) (analysis of 18 scats) | Northcentral Idaho | Snowshoe hare (50.0), ungulate (>30), voles (27.7), red squirrel (22.2), insects (22.2) |
| Aubry and Raley (2006) (analysis of 387 scats) | Southern Oregon Cascades | Squirrels (33.9), birds (28.2), insects (25.6), hares and rabbits (22.5) |
| Golightly et al. (2006) (analysis of 388 scats) | Northwestern California | Insects (55.2), seeds/fruit (33.8), squirrels (26.8), birds (26.0), reptiles (24.5) |
| Grenfell and Fasenfast (1979) (analysis of 8 stomachs) | Northwestern California | Fungi (50), plant material (50.0), beetles (25.0), deer (25.0), *Peromyscus* spp. (25.0), |
| Zielinski et al. (1999) (analysis of 201 scats) | Southern Sierra Nevada, Calif. | Insects (55.7), birds (39.8), *Martes* spp. (20.4), reptiles (20.4), squirrels (20.4), seeds/fruit (20.4) |

Food habits studies infrequently report avian prey items to species; however, the birds that are reported are almost exclusively diurnally-active species (e.g., passerines, jays, grouse, and woodpeckers), and are thought to be caught most often while on the ground (Powell 1993) or scavenged (Raine 1987). Powell (1993) for example, believed that jays were consumed while foraging on carrion that fishers were also feeding on.

Although there has been no formal diet analyses conducted on fishers in Washington, Scheffer (1995) did report information gathered by trappers and naturalists who examined fisher stomach contents or observed fisher foraging. It was believed that on the Olympic Peninsula, fisher diets consisted of mountain beaver, squirrels, and snowshoe hares. Fisher scats were also observed to contain huckleberries and salal berries (Scheffer 1995). Complete results of scat analysis from the Olympic reintroduction are pending, but preliminary results suggest mountain beavers are a significant prey item (Lewis et al. 2011).

## EXISTING CONDITIONS IN THE PROJECT AREA

### Habitat Conditions

For analysis purposes, the habitat assessment conducted as part of the Washington State feasibility study (Lewis and Hayes 2004) defined suitable fisher habitat as low- and mid-elevation, late-successional forest. Based on this definition, the Cascades contain almost 6,455 $km^2$ of suitable habitat (Table 3), with about eight percent of that on NPS lands in MORA and NOCA. Together, the two park units contain almost 525 $km^2$ of suitable fisher habitat.

**Table 3. Suitable Fisher Habitat in the Cascades**

| Ecosystem | Total Suitable Habitat (approximate) | Suitable Habitat in NPS unit (approximate) |
|---|---|---|
| **South Cascades** | 773,560 acres (~3,130 $km^2$) | 38,200 acres (~155 $km^2$) in MORA |
| **North Cascades** | 821,510 acres (~3,325 $km^2$) | 91,460 acres (~370 $km^2$) in NOCA |
| **TOTAL** | 1,595,070 acres (~6,455 $km^2$) | 129,660 acres (~524 $km^2$) |

Source: Lewis and Hayes 2004; NPS files
*Acreage/ha based on I-90 as the barrier between SW and NW Cascades. Acreage/ha rounded to the nearest 10th.

## EFFECTS OF THE PROPOSED PROJECT ON FEDERALLY LISTED SPECIES

This section includes the evaluation of the effects of the proposed fisher restoration project on federally listed species in the project area. Three aspects of the proposed project are included, which account for all of the interrelated and interdependent actions related to this proposed project:

1. The direct effects of the implementation process, whereby fishers would be released;
2. The direct effects of up to tenyears of post-release monitoring; and
3. The indirect effects of a restored fisher population (into perpetuity).

This section also includes effects from cumulative effects on protected species, which may result from future state, local, or private actions that are reasonably certain to occur in the project area and that may destroy, degrade, or fragment the habitat of threatened, endangered, and candidate species. Future federal actions that are unrelated to the proposed project are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. For all the species listed below, the two parks assume that future private and state actions would occur at similar intensities as in recent years. The actions that may potentially affect listed species are continuing flight operations by non-federal entities, and other non-federal activities such as development and forest management on private lands

near the parks. Future non-federal activities could occur outside MORA and NOCA, but within the action area of the project (e.g. flight corridors outside the parks). The general types and amounts of potential actions which may occur are largely unknown, but could include non-federal forest management and other nonfederal management actions (such as recreation and development) within suitable habitat.

Analysis of effects is limited to those species that live in or near predicted fisher habitat. The information in this analysis was obtained through best professional judgment of staff from the NPS, WDFW, USFWS, fisher and spotted owl experts, and available literature. This project is unlike most evaluated through this process because it is not a major construction activity, as discussed in the ESA consultation handbook (USFWS 1998), and it is not of a short-, or even moderate-term duration, but must be evaluated in perpetuity.

## Marbled Murrelet (Federal Threatened)

### Background

The marbled murrelet is a pigeon-sized seabird that lives primarily in the nearshore marine environment but nests in old-growth forests. Most murrelets nest within 60 km of the coast, although some may go as far as 84 km inland (Nelson et al. 2006). Murrelets belong to the Alcidae family, whose species are sometimes referred to as the black-and-white "penguins of the north." Based on surveys completed in 2010, it is estimated that 3,400 to 8,300 murrelets occur in Washington State (Pearson et al. 2011).

Nesting by murrelets begins in late March when females lay a single egg. Chicks hatch after about a 30-day incubation period, and remain in the nest for 27 to 40 days after hatching. Murrelets are solitary nesters; both adults share incubation duty and they exchange incubation duties every 24 hours. The single chick is brooded only for a couple days, after which they sit alone on the nest while the adults forage at sea. Adults bring food to the chick at dawn and dusk. When ready to fledge, the chicks fly alone, at dusk, directly to sea (Nelson et al. 2006). Because murrelets are asynchronous breeders, and can re-nest after an early nest failure, murrelet nesting season is up to 182 days (Nelson et al. 2006). The breeding season lasts from April 1 to September 23 (USFWS 2013a).

Suitable nesting habitat for murrelets consists of multilayered, old-growth conifer stands with moderate to high canopy closure and within approximately 80 km of saltwater feeding areas. Murrelets feed on small ocean fish, such as anchovy (*Engraulis mordax*), herring (*Clupea pallasii*), and sardine (*Sardinops sagax*) (USFWS 2014a). From March to mid-July marbled murrelets nest on naturally occurring platforms on large-diameter (greater than 15 cm) conifer limbs at heights of 15.2 m or more above the ground. They more commonly occupy larger stands (greater than 2 $km^2$) that support trees with large branches or deformities for nest platforms (USFWS 2014a). The nest platforms are created by normal growth, disease, mistletoe, or deformed branching. In the Pacific Northwest, most nests are located on a large branch with a moss substrate and canopy cover over the nest. Murrelets nest in younger stands with remnant large trees or younger trees with deformities that provide nesting opportunities.

The marbled murrelet recovery plan identifies six broad "Marbled Murrelet Conservation Zones" across the listed range of the species to geographically define recovery goals and objectives. In Washington, there are two conservation zones: Puget Sound (Conservation Zone 1) and Western Washington Coast Range (Conservation Zone 2) (USFWS 1997). Conservation Zone 1 includes all the waters of Puget Sound and most waters of the Strait of Juan de Fuca south of the U.S.-Canadian border

and extends inland 89 km from the Puget Sound, including the north Cascade Mountains and the northern and eastern sections of the Olympic Peninsula. Forest lands in the Puget Trough have been predominately replaced by urban development and the remaining suitable habitat in Zone 1 is typically a considerable distance from the marine environment, lending special importance to nesting habitat close to Puget Sound (USFWS 1997). The murrelet population in Conservation Zone 1 has been declining over the past decade, and was estimated at 5,679 birds in 2010 (95 percent confidence limit = 3,339 – 8,313 murrelets) (Pearson et al. 2011). MORA and NOCA are located in Conservation Zone 1, and all murrelets nesting in the parks are considered to be part of the Conservation Zone 1 murrelet population.

***Mount Rainier National Park***

MORA has conducted surveys for murrelets in the park annually from 1994 to 2011. To date, murrelet presence has been documented within four watersheds: the Carbon, Mowich, Puyallup, and Nisqually River basins (Dhundale 2009). Based on the presence of suitable murrelet nesting habitat and multiple detections indicating presence or occupancy behaviors, it is assumed that murrelets are nesting in these areas. However, because of the difficulty of detecting murrelet nests, no active nests have been located within the park (Dhundale 2009).

With the establishment of the Northwest Forest Plan in 1994, the range of the murrelet for management and conservation purposes was established at 89 km inland from marine waters in Washington (Raphael et al. 2006). Essentially the entire park, with the exception of a small area in the southeast corner of the park, is located within the potential range of the murrelet. The murrelet potential nesting habitat maps produced by Raphael et al. (2006) indicate there is approximately 107 $km^2$ of potential murrelet nesting habitat in the park extending up to an elevation of about 1,160 m, which constitutes about 11 percent of the park area.

The park provides large blocks of murrelet nesting habitat and supports reproductive pairs of murrelets. Because most of the park is designated wilderness, high-quality murrelet nesting habitat within the park is largely undisturbed by development or human presence. Murrelet nesting habitat within the park is considered essential for the long-term conservation and recovery of murrelets (USFWS 1997). High quality habitat is distributed along the western boundary of the park in valleys running east and west, separated by high elevation ridges. Lower quality suitable habitat continues along the southern and southeastern areas of the park. Critical habitat for the species has been designated within Lewis and Pierce counties, but the designation does not include the park.

Audiovisual surveys have detected breeding behavior (subcanopy flights) in the Carbon, Mowich, and Puyallup rivers. Thus, these drainages are considered “occupied” per USFWS guidelines. Repeated radar surveys along the Nisqually River at Kautz Creek and Tahoma Creek confluences have detected very few (mean 4.7 per day, range 1 to 12) murrelet targets, suggesting that the Nisqually River drainage contains few murrelets (Hamer Environmental 2000; ABR, Inc. 2005, 2008, 2009). Despite many years of surveys at several locations, no ground observer has ever detected marbled murrelets in the Nisqually River drainage.

***North Cascades National Park Service Complex***

Much of the available suitable habitat for marbled murrelets in NOCA is located between 68 km and 86 km from the nearest saltwater, well within the known nesting distance of marbled murrelets; however, no active nests have ever been recorded in NOCA. There are six unverified records of individual marbled murrelets observed on Ross Lake, Diablo Lake, and on Baker Lake just west of the park

boundary (NOCA wildlife database). Radar surveys were conducted at six sites in and adjacent to NOCA in 2008 to determine presence, numbers and flight patterns, murrelet-type targets or probable absence of murrelets (Hamer Environmental 2009). A total of 59 murrelet-type targets were detected and presumed to be murrelets based on flight speed, size, shape, and time of day, but no positive confirmation of murrelets or active nests were made. Other areas of suitable habitat exist in NOCA, but have not been surveyed to date. Existing data suggest they are an uncommon species in the park.

### Effects of the proposed fisher restoration project

*Release Actions:* Fisher releases would not take place during murrelet nesting season. Consequently, fisher release actions would have no effect on marbled murrelets.

*Post Release Monitoring:* Post release monitoring would be conducted via road and foot access in front country areas, and through the use of small fixed-wing aircraft in the backcountry areas of the park and forest. Carcass retrievals and den-site investigations would be conducted via foot access. The use of vehicles on park roads and foot access on trails during monitoring efforts would not disturb murrelets that inhabit the surrounding areas as it would not produce noise above existing ambient levels. The level of monitoring traffic would not be above background use of the areas, and murrelets that inhabit areas near roads and trails have probably adapted to some levels of noise and human presence associated with the roads. All fixed-wing flights would be flown at elevations greater than 111 yards above the tree canopy which is the distance greater than the threshold distance that could adversely affect murrelets through disturbance (USFWS 2013a). Consequently, fisher monitoring actions are not likely to adversely affect marbled murrelets.

*Indirect effects of a restored fisher population:* Because a restored fisher population would inhabit the same forests used by marbled murrelets for nesting, there is a potential for fishers and murrelets to interact. However, fishers and marbled murrelets coexisted in the Cascades for millennia prior to the recent extirpation of fishers. Because the habitat in the parks is largely intact, it is expected that these species would co-exist as they did prior to fisher extirpation. Fishers may use some of the same types of structures for resting (large limbs) that murrelets use for nesting; however fishers are likely to use these structures lower in the canopy than those used by murrelets. Currently, extensive suitable habitat and habitat structures for both species exists throughout the parks. Habitat use, demographic and behavioral characteristics of fishers and murrelets make interactions between the two species extremely unlikely to occur. Habitat is not limiting for either species and therefore neither species would be concentrated in certain locations. Both species occur in low densities, further limiting the likelihood of interactions. Fishers predominantly seek prey on the forest floor and tend to use rest and den sites below the canopy, and therefore do not use the same microhabitats as murrelets.

Because fishers forage occasionally in trees, and consume birds, they may be a potential predator of incubating adult murrelets, eggs, or chicks. However, fisher predation on marbled murrelets is expected to be extremely unlikely to occur, for several reasons:

- Fishers and murrelets co-exist have been studied extensively in portions of northwest California and there is no documentation of fishers preying on murrelets.
- Nesting murrelets occur in the Cascades in very low densities. Restored fishers are also expected to occur at low densities. These two factors combined make it extremely unlikely that a fisher would encounter a murrelet and kill it.
- Although birds may occur in fisher scats with up to 25 percent frequency, the majority of fishers' prey is small and medium sized mammals (Tables 1 and 2). Most fisher studies report birds as

unidentifiable to the species level, however in studies where birds were identified to species, the birds identified were primarily diurnal species, and it is thought that most were captured while foraging on the ground (Powell 1993) further decreasing the likelihood that fishers would prey on murrelets.

- Murrelets and fishers use different parts of the tree canopy: murrelets nest in the upper canopy, and fishers tend to use rest sites and den sites on the bole below the canopy (Aubry and Raley 2006, K. Raley, USFS-PNW, pers comm, M. Higley, Hoopa Tribal Forestry and S. Yager, USFWS, pers. comm.), further diminishing the chances for a fisher/ murrelet encounter.
- The majority of fisher foraging activities occur on the ground (Powell 1993), not in the upper canopy where murrelets nest, further diminishing the chances of fisher predation on murrelets.
- While marbled murrelet nest failure is often caused by predation, the primary nest predators are corvids (e.g. ravens and jays). Corvids and squirrels were observed to be key predators of artificial nests (Nelson et al. 2006).
- Studies of radio-telemetered murrelets on the Olympic Peninsula have not detected any nest failures due to predation. Instead, the cause appears to be related to poor ocean conditions resulting in chick starvation or nest abandonment by adults (Raphael 2007).
- Fledgling murrelets could become vulnerable to fishers if they became grounded during flights from the nest to the ocean; however, the fledging strategy for murrelets is for the chick to fly directly from the limb to the sea. Grounded nestlings are either sick, or fell out prematurely, and are not expected to survive in the wild.

In summary, all three phases of the proposed fisher restoration are expected to either have no effect, or to be extremely unlikely to affect marbled murrelets. Given these considerations, the proposed fisher restoration project "may affect but is not likely to adversely affect" marbled murrelets.

### Critical Habitat

No critical habitat has been designated within MORA or NOCA for marbled murrelets. Therefore, there would be no effect to critical habitat for marbled murrelets.

## Northern Spotted Owl (Federal Threatened)

### Background

The northern spotted owl is a medium-sized owl with dark eyes, dark-to-chestnut brown coloring, and whitish spots on the head and neck, with white mottling on the abdomen and breast (USFWS 2014b). Northern spotted owls nest, roost, and forage in late-successional forests characterized by high canopy cover and complex structure (Forsman et al. 1984, Gutierrez et al. 1995, Hershey et al. 1998). Suitable habitat is characterized by moderate to high canopy closure (60–80 percent); a multilayered, multispecies canopy with large overstory trees (greater than 76 cm in diameter at breast height); a high incidence of large trees with various deformities, cavities, broken tops, or mistletoe infestation; large snags; large accumulations of down trees, and other woody debris on the ground; and sufficient open space below the canopy for flying (Thomas et al. 1990, USFWS 2014b).

The northern spotted owl (spotted owl) was listed as a threatened species in 1990 because of widespread loss of suitable habitat across the species' range and the inadequacy of existing regulatory mechanisms to conserve the species (USFWS 1990). Many populations of spotted owls continue to decline, especially in the northern parts of the species' range. Over the past decade it has become apparent that competition from the barred owl (*S. varia*) poses a significant threat to the spotted owl. Past habitat loss and current habitat loss are also threats to the spotted owl, even though loss of habitat

due to timber harvest has been greatly reduced on federal lands for the past two decades as a result of the Northwest Forest Plan (USFWS 2008a).

In Washington, the northern spotted owl specializes on nocturnal arboreal prey; 88.3 percent of observed prey items in the western Cascades were nocturnally-active prey (Forsman et al. 2001). In the western Cascades, spotted owl diets are dominated by flying squirrels (*Glaucomus sabrinus*), however they also consume juvenile snowshoe hares (*Lepus americanus*), pocket gophers (*Thomomys* sp.), and pika (*Ochotona princeps*) (Forsman et al. 2001). See *Table 4: Diet composition of northern spotted owls in the Washington Cascades*.

**Table 4: Diet composition of northern spotted owls in the Washington Cascades[1].**

| Species | Percent frequency in diet | Percent weight in diet |
|---|---|---|
| **Flying Squirrels** | 29.3 | 45.3 |
| **Snowshoe Hares (juv)** | 1.9 | 8.9 |
| **Pocket gophers** | 6.9 | 8.7 |
| **Pika** | 3.0 | 6.0 |
| ***Peromyscus*** | 15.2 | 4.9 |
| Data from Forsman et al. 2001. | | |

Critical habitat for the northern spotted owl has not been officially designated in the two parks. However, both parks contain high quality northern spotted owl habitat that is managed and safeguarded by virtue of inclusion in a national park.

***Mount Rainier National Park***

At Mount Rainier, the spotted owl nesting season extends from March 15 through September 30. The nesting season is divided into early and late seasons. The early nesting season is defined as March 15 to July 31. Early nesting season behavior includes nest site selection, egg laying, incubation, and brooding of nestlings to the point of fledging (Forsman et al. 1984). The late nesting season extends from August 1 through September 30. During this period, juvenile spotted owls have left the nest and are able to fly short distances, but they remain close to the nest site and depend upon the adults for feeding. By late summer, the adults are rarely found roosting with their young and usually only visit the juveniles to feed them at night (Forsman et al. 1984). Juvenile owls typically disperse away from their natal sites in late September or early October, and become non-territorial "floaters" for two to five years before they acquire their own territories (Forsman et al. 2001).

Mount Rainier National Park contains approximately 324 $km^2$ of suitable spotted owl habitat (Myers 2009). Spotted owl habitat extends up to an elevation of about 1,463 m in the park. Surveys for spotted owls have been conducted annually in the park since 1997 as part of an ongoing spotted owl demography study (Myers 2009). In 2013, an expected non-nesting year, spotted owls were detected at 14 sites in the park, including nine pair sites, with a single successful nesting attempt (Bagnall 2013). It is common for spotted owls to nest in alternating years, with most nesting attempts occurring in even years, and relatively few nesting attempts documented in odd years (Anthony et al. 2006). In 2012, an average of 0.40 young fledged per territorial female (Bagnall 2012). Not all suitable habitat in the park has been surveyed for spotted owls. Approximately ten percent of the suitable habitat in the park is not surveyed during annual monitoring, and additional owl pairs may be present in these areas.

Mount Rainier National Park constitutes approximately 40 percent of the entire Rainier Spotted Owl Demographic Study Area (DSA). The spotted owl population in the north half of the Rainier DSA has

declined significantly, and now more than half of the spotted owls remaining in the DSA (including most of the breeding pairs) are located within the park (Raedeke Assoc. 2013). Monitoring in the Rainier DSA indicates the spotted owl population has declined annually since 1995, resulting in a loss of approximately 40 to 60 percent of the occupied owl territories in the study area (Forsman et al. 2011). Competition with barred owls is implicated as the primary cause for this decline (Forsman et al. 2011). Barred owls have now been detected at 94 percent of spotted owl sites monitored in the park (Bagnall 2013). Barred owls were first detected in the park in 1986, and by 2013, there were 53 probable barred owl territories identified in the park (Bagnall 2013). Despite the apparent high densities of barred owls in the area, low numbers of spotted owls continue to persist and successfully reproduce in the park. Although spotted owl habitat in the park is restricted to a relatively narrow band around the perimeter of Mount Rainer, this habitat currently supports a small population of spotted owls and is considered essential for the long-term conservation of the species. In the spotted owl recovery plan, the USFWS identified suitable spotted owl habitat in the park as part of a network of "Managed Owl Conservation Areas" in western Washington. The Managed Owl Conservation Areas represent areas the USFWS considers essential for spotted owl recovery (USFWS 2008a).

***North Cascades National Park Service Complex***

NOCA conducted a four-year baseline inventory of spotted owls from 1993–1996 (Kuntz and Christophersen 1996). All potential forested habitat below 1,220 m was identified and surveyed to locate sites used by breeding spotted owls. Eleven spotted owl activity sites were identified. Pair occupancy was documented at six activity sites. Single spotted owls were found at five additional sites. Thereafter, some sites have been monitored more regularly than others in response to NEPA compliance for management activities occurring near a known spotted owl activity site. Productivity has been highly variable at the monitored sites, but low overall.

From 1997-2010, NOCA partnered with the Institute for Bird Populations and resurveyed a portion of the same transects and historical spotted owl activity sites from the initial survey period of 1993-1996 (Siegel et al. 2009b; Siegel et al. 2012). Results from these surveys suggest at least four historical spotted owl activity sites were lost since the initial surveys, and no new spotted owl activity sites were documented from the resurveys. Although methodology was not tailored to locate barred owl activity sites, their detection numbers increased from 27 to 34 from initial survey detection numbers.

The northern spotted owl is experiencing population declines within NOCA and throughout their geographic range. Populations in Washington exhibited a long, gradual decline after the mid-1990s, and have declined 40–60 percent over the last 15 years (Davis et al. 2011). Surveys conducted during 2007 and 2008 in the portion of NOCA east of the crest of the Cascades documented spotted owl pairs at four or five historically occupied sites (Siegel et al. 2009b). However, west of the Cascades crest in the Upper Skagit watershed, only two individual owls were detected at historically occupied sites during breeding season surveys conducted in 2009 and 2010 (Siegel et al. 2012). Average habitat suitability for spotted owls has remained relatively high in the western Washington Cascades, and habitat loss has been estimated at only 0.4 percent (Davis et al. 2011). Similarly, habitat within the park has not changed substantially since the early 1990s, but abundance of barred owls has increased on both sides of the Cascades crest by more than 25 percent (Siegel et al. 2012). Thus, displacement by barred owls is implicated as a major cause of spotted owl population decline in NOCA and throughout the region (Forsman et al. 2011).

### Effects of the proposed fisher restoration project

*Release Actions:* Fisher releases would not occur during spotted owl nesting seasons. Consequently, fisher release actions would have no effect on northern spotted owls.

*Post Release Monitoring:* The use of vehicles on park roads, and foot access during monitoring efforts would not likely disturb spotted owls that inhabit the surrounding areas. The level of monitoring traffic would not be above background levels, and spotted owls that inhabit areas near roads and trails have probably adapted to some levels of noise and human presence associated with the roads. All fixed-wing flights associated with telemetry would be flown at elevations greater than 111 yards above the tree canopy, a distance greater than the threshold distance that could adversely affect spotted owls through disturbance (USFWS 2013a). Helicopters would not be used during spotted owl nesting seasons. Consequently, fisher monitoring actions are not likely to adversely affect northern spotted owls.

*Indirect effects of a restored fisher population:* Because a restored fisher population would inhabit the same forest types and landscapes used by spotted owls for nesting, roosting and foraging, there is a potential for fishers and spotted owls to interact. However, fishers and northern spotted owls coexisted in the Cascades for millennia prior to the recent extirpation of the fisher. Because the habitat in the parks is largely intact, it is expected that these two species would co-exist as they did prior to the extirpation of the fisher.

Fishers use the same structures for denning (tree cavities) that spotted owls often use for nesting. However, little or no competition or interactions are expected because extensive suitable habitat and habitat structures for both species exist throughout the parks. Because both species would exist at low densities and suitable habitat is not limiting, competition for denning structures is not expected to occur.

Although fishers and spotted owls both prey on some of the same animals, the effect of fisher reintroduction on spotted owls through competition for food resources is expected to be insignificant and discountable for the following reasons:

- Although they feed on a variety of species, spotted owls are prey specialists and target nocturnally-active, arboreal small mammals, in particular the northern flying squirrel. In comparison, fishers are prey generalists, with flexible diet selection patterns throughout their range. Fishers prey on a variety of species, and target ground dwelling species and diurnally active species. In addition, fishers infrequently prey on flying squirrels, which are a significant portion of the spotted owl diet (Powell 1993, Powell and Zielinski 1994). The diversity of small mammals in the two parks and the flexibility in the fishers' diet would limit their effects on the prey base for northern spotted owls.
- Prey habitat conditions in the parks have not been affected by human land management practices; the parks support a diverse and, in all probability, adequate prey base for both species.

Because fishers forage occasionally in trees, and occasionally consume birds, they may be a potential predator of incubating adult spotted owls, chicks, or eggs. However, for several reasons (listed below), fisher predation on northern spotted owls is expected to be extremely unlikely to occur:

- As noted above, both species are expected to occur in the parks at low densities; the chance of their encountering each other would be extremely low.
- Fisher rest and den sites are in lower to mid canopy (12.2 to 17 m high) whereas spotted owls nest higher in the canopy (Forman and Giese 1997, M. Higley, Hoopa Tribal Forestry and S. Yaeger, USFWS, pers. comm.), further decreasing a chance for an encounter or predation.

- Based on foraging habits data derived from tracking fisher during foraging bouts (Coulter 1966, Powell 1993), and an examination of prey consumed by fishers during those bouts (e.g. snowshoe hares), it is evident that the majority of fisher foraging activities occur on the ground, further diminishing the chance that a fisher would encounter a nesting spotted owl or young.
- Spotted owls in MORA nest every other year, and sporadically in NOCA, thus decreasing even further the chance of predation on nesting birds and nestlings.
- Although birds may occur in fisher scats with up to 25 percent frequency, birds do not comprise a major component of fisher diets, anywhere. The majority of fishers' prey is small and medium sized mammals (Tables 1 and 2). Most fisher studies report birds as unidentifiable to the species level; however in studies where birds were identified to species, the birds identified were primarily diurnal species. In addition, many researchers felt that birds were caught while on the ground (Powell 1993) or were scavenged (Raine 1987). In the only studies where owls were reported in fisher diets, they were either miscellaneous Strigiformes (Coulter 1966: study was done in Maine), or a much smaller western screech owl , which was recovered at a den or rest site and may not have been killed by the resident fisher (Aubry and Raley 2006).
- Fishers' range overlaps extensively with Northern and California spotted owls in Oregon and California. Although there are a few anecdotal accounts of fishers being seen in proximity of owl nests (P. Carlson, Colorado State University, pers. comm., L. Diller, Green Diamond Resource Company, pers. comm., and M. Higley, Hoopa Tribal Forestry, pers. comm., J. Lewis, WDFW, pers. comm.) there is no documentation of a fisher preying on a spotted owl, either adults, chicks, or eggs. This is despite the fact that there has been decades of extensive research on both species where they co-occur at much higher densities than they would be expected to occur in the two parks.
- The *Revised Northern Spotted Owl Recovery Plan* (USFWS 2011b, p. III-55) states that "Known predators of spotted owls are limited to great horned owls (*Bubo virginianus*) (Forsman et al. 1984), and, apparently, barred owls (Leskiw and Gutiérrez 1998)." Other suspected predators include northern goshawks (*Accipiter gentilis*), red-tailed hawks (*Buteo jamaicensis*), and other raptors (Courtney et al. 2004). Occasional predation of spotted owls by these raptors is not considered to be a threat to spotted owls. If known predators are not considered a threat to existing spotted owl populations, then the fisher (a species that is not recognized as a threat to spotted owls) is unlikely to have an adverse effect on spotted owls.

In summary, the effects of all three phases of the proposed fisher restoration are expected to either have no effect, or to be extremely unlikely to occur. Given these considerations, the proposed fisher restoration project "may affect but is not likely to adversely affect" northern spotted owls.

### Critical Habitat

No critical habitat has been formally designated with the two parks for northern spotted owls. Therefore, there would be no effect to critical habitat for northern spotted owls.

## Grizzly Bear (Federal Threatened)

### Background

Grizzly bears (*Ursus arctos*) are long-lived omnivores that require large areas of suitable habitat to meet their ecological requirements (North Cascades Grizzly Bear Recovery Team 2004). In ecosystems similar to the Cascades, grizzly bears range in size from 114-218 kg (250-480 lbs) (Servheen 1983, McLellan 1994). Home range sizes in an ecosystem similar to the Cascades were found to be 76-667 $km^2$

for females and 168-1,178 $km^2$ for males (Waller and Mace 1997). Females do not generally have their first litter until they are four years of age or older, giving birth to one to four cubs every three to four years (Aune et al. 1994, Schwartz et al. 2003, Garshelis et al. 2005).

Grizzly bears are opportunistic generalists that adapt to local resource availability (Mace and Jonkel 1986, Ciarniello et al. 2007, Serrouya et al. 2011, Fortin et al. 2013). In areas most similar to the Cascades, grizzly bears' diets are comprised mostly of vegetation (Mace and Jonkel 1986, McLellan and Hovey 1995, Jacoby et al. 1999), with opportunistic use of animal proteins ranging from insects to mid-size mammals (White et al. 1998, Munro et al. 2006). Use of fish spawning runs by black bears has been observed within NOCA (NOCA files), and it is reasonable to assume grizzly bears may also use this resource. Black bears are known to take deer fawns in the North Cascades (NOCA files); it is probable grizzly bears do so as well.

Grizzly bears hibernate during roughly half of the year. Entrance and emergence dates for grizzly bears in the North Cascades are not known. Female black bears (*Ursus americanus*) in the Pasayten Wilderness adjacent to NOCA initiated denning from October 15th to November 19th and emerged between April 4th and May 22nd. Males denned a little later (October 22-November 19) and emerged earlier (April 4-May 7; Gaines 2003). Grizzly bear den site selection would be expected to be in subalpine to alpine habitats in the Cascades, but might not be limited to higher elevations (Servheen and Klaver 1983, Ciarniello et al. 2005).

The US Fish and Wildlife Service (USFWS) listed the grizzly bear as a threatened species in 1975. Grizzly bears were listed as an endangered species by the state of Washington in 1980. The 25,322 $km^2$ North Cascades Ecosystem (NCE) in Washington was designated in 1991 as one of five grizzly bear recovery zones in the contiguous United States. NOCA comprises approximately 11 percent of the total area of the recovery zone and contains about 25 percent of the designated wilderness within the zone (USFWS 2011a).

#### *Mount Rainier National Park*

Although MORA is within the historical range for the grizzly bear (USFWS 2011a), there are no published records or confirmed sightings within the park. The nearest confirmed report of grizzly bears near MORA was tracks of a sow and cub 40 km west of the park in 1993 (North Cascades Interagency Grizzly Bear Technical Team, pers. comm.).

#### *North Cascades National Park Complex*

The number of grizzly bears in the North Cascades ecosystem (Washington and British Columbia) is likely to be fewer than ten (NCE Interagency Grizzly Bear Technical Team, pers. comm., BC Ministry of Forests, Lands and Natural Resource Operations 2012). Four individual grizzly bears were confirmed within the park during the 1986-1991 North Cascades Grizzly Bear Ecosystem Evaluation (Almack et al. 1993). The most recent Class 1 sighting (photograph) in NOCA occurred in the upper Cascade River watershed in October 2010 and was the first confirmed sighting in the U.S. portion of the ecosystem since 1996 (IGBC 2011). An individual grizzly bear was confirmed approximately 24 km outside of NOCA in B.C.'s Manning Provincial Park in 2010 (photograph), 2012 (DNA, photograph), and 2013 (video) (A.N. Hamilton, Ministry of the Environment, pers. comm.). From 2008 to 2012, noninvasive hair snagging methods, scat detection dogs, and remotely triggered cameras were deployed extensively within Washington's NCE as part of a wide-spread landscape genetics study of black bears

as the focal species (Long et al. 2013). While 561 unique black bears were genotyped, no grizzly bears were detected in the approximately 23 percent of the ecosystem surveyed.

### Effects of the proposed fisher restoration project

*Release Actions:* Grizzly bears are extremely rare in NOCA. Although nothing is known about grizzly bear denning chronology in the North Cascades Ecosystem, black bear denning is known to take place in the Pasayten Wilderness, adjacent to the eastern boundary of NOCA, from approximately late October to mid-May (Gaines 2003). Based on the assumption that the time frames are somewhat similar for grizzly bears (e.g. Servheen and Klaver 1983), fisher releases would not occur when grizzlies would be active.

*Post Release Monitoring*: Given the rarity of grizzly bears in NOCA, it is extremely unlikely that grizzly bears would be encountered, and any additional human use of the area by on the ground monitoring activities would be small. Fixed-wing aircraft associated with aerial telemetry could affect grizzly bears. However, flights would be limited to five times per month and would be limited to elevations greater than 111 yards above tree canopy, where bears would be in security cover. Consequently, fisher monitoring actions are not likely to adversely affect grizzly bears.

*Indirect effects of a reintroduced fisher population:* There would likely be overlap in habitat for grizzly bears and fishers, such as occurs now with pine marten and other mustelids, and there is a potential for grizzly bears and fishers to interact. However, the establishment of a self-sustaining population of fishers is not expected to affect grizzly bears for the following reasons:

- Extensive suitable habitat exists for both fishers and grizzly bears throughout NOCA, therefore habitat is not limiting for either species, and it is expected that these species would co-exist as they did prior to fisher extirpation.
- Both species would occur in very low densities, further limiting the likelihood of interactions.
- Although grizzly bears may be found anywhere within their home range throughout their active period (McLellan and Hovey 2001), they are associated primarily with open habitats (Holm et al. 1999), thus reducing the potential for interaction. Based on research in similar ecosystems – as well as black bear habitat use in the North Cascades (Lyons et al. 2003) – we assume grizzly bears likely rely primarily on vegetation within NOCA (and the NCE as a whole), mostly in subalpine meadows and avalanche chutes (Mace and Jonkel 1986, Waller and Mace 1997, Munro et al. 2006, Serrouya et al. 2011).
- Grizzly bears' use of small mammals would overlap with fishers, but as the density of both species would be very low for the foreseeable future, and grizzly bears' reliance on these protein sources even lower, competition for these resources is likely to be negligible.

In summary, the three phases of the proposed fisher restoration are expected to either have no effect on, or to be extremely unlikely to affect grizzly bears. Given these considerations, the determination of effect grizzly bears from the proposed fisher restoration project is "may affect but is not likely to adversely affect."

### Critical Habitat

No critical habitat has been formally designated for grizzly bears throughout the Recovery Area, although NOCA contains high-quality habitat that is important to the species. Critical habitat was not designated because of the difficulty in defining specific areas for this wide-ranging omnivore. Therefore, there would be no effect to critical habitat for grizzly bears.

## Gray Wolf (Federal Endangered)

### Background

The gray wolf (*Canus lupus*) is a top-level carnivore and the largest member in the canid family. Size and appearance can vary depending on sex and geographic locale. In Montana, adult males average 40-49 kg and females average 36-40 kg (USFWS 1994). In British Columbia adult male wolves average 35-50 kg and adult females average 30-40 kg (B.C. Ministry of Environment 2012). Most adult wolves measure about 66-81 cm tall at the shoulders and are from 137-198 cm long from nose to tip of tail (Mech 1970, Mech 1974). Coloration of wolves can vary from white to a mixture of gray, brown, black and white, to various shades of gray or black (Paquet and Carbyn 2003).

Although some wolves are solitary, most are highly gregarious and live in packs with complex social structures. A pack is typically composed of a dominant breeding pair (alphas) plus offspring one to three years old, and sometimes two or three such families (Mech 1970, Hatler et al. 2008). Pack size is variable and ranges from 2-11 animals in northwest Montana, to 5-27 in the greater Yellowstone area (USFWS et al. 2001). Wolves naturally recolonizing in eastern Washington have established pack sizes ranging from 2-12, averaging 5.6 wolves per pack (Becker et al. 2013). Although not fully understood, pack size appears to be influenced by their primary prey, whereas packs that feed on moose are, on average, larger than those that feed on deer (Mech and Boitani 2003, Hatler et al. 2008). Dispersal of young generally occurs at approximately 1-2 years of age with a few remaining with the pack for up to three years (Gese and Mech 1991, Mech et al. 1998).

Wolves are habitat generalists and can occupy nearly any habitat that supports sufficient prey (Mech 1995). In most populations wolves occupy exclusive territories that they defend against intruding wolves. Territory size can vary depending on several factors. Wolf pack territories in Idaho range from about 518-1813 $km^2$ with an average of 930 $km^2$ (Mack and Laudon 1998). In Montana territories average around 518 $km^2$ with a maximum calculated at 1243 $km^2$ (Hanauska-Brown et al. 2012). In Washington, territories ranged from approximately 298-1450 $km^2$ and averaged 826 $km^2$ (Becker et al. 2013). Pack territory sizes are subject to change over time due to several factors including, availability of prey, conflicts with nearby packs, elevation, and changing human land-use patterns.

Wolves are opportunistic predators and scavengers that feed primarily on ungulates throughout their range (Mech 1970, Weaver 1994, Paquet and Carbyn 2003). Ungulate species comprise different proportions of wolf diets, depending on the relative abundance and distribution of available prey within the territory. In northwestern Montana, white-tailed deer comprised 83 percent of wolf kills, whereas elk and moose comprised 14 percent and 3 percent, respectively (Kunkel et al. 1999). In Yellowstone National Park, 87 percent of wolf kills during 1999 were elk (Smith et al. 2000), and elk was also the major prey species in Banff National Park, Alberta (Huggard 1993). In central Idaho, elk (53 percent) and deer (42 percent) were the most frequently detected species in scat samples collected in summer 1997 (Mack and Laudon 1998). Diets of wolves on the mid-coast of B.C. and coastal Alaska were overwhelmingly comprised of black-tailed deer, with a small component of salmon and marine mammals when available, and smaller proportions of various other prey (Person et al. 1996, Darimont and Paquet 2000, Darimont et al. 2003, 2008, Watts et al. 2010). White-tailed deer was the most important, followed by moose as the second most important food of wolves in the Beltrami Island State Forest of northwest Minnesota in winter and summer, both in terms of biomass and number of individuals eaten (Fritts and Mech 1981).

Smaller animals become more important in the diet of wolves during the snow-free months, but ungulates remain the primary food source. Wolf scat collected in Yellowstone National Park in 1998 contained voles, ground squirrels, snowshoe hare, coyote, bear, insects, and vegetation (Smith 1998). Earlier work in northwestern Montana also documented non-ungulate prey species, such as: the ruffed grouse, raven, striped skunk, beaver, coyote, porcupine, and golden eagle (Boyd et al. 1994, Arjo et al. 2002).

Historically, gray wolves occupied virtually all of North America. Hunting and other human activities eliminated the gray wolf from Washington by the early 20$^{th}$ century. It was not until the early 1990s that lone wolves or small groups were documented again in the North Cascades, presumably originating from British Columbia (Wiles et al. 2011). Wolves are continuing to naturally recolonize Washington with at least 52 known wolves from 13 confirmed wolf packs with five successful breeding pairs as of March 2014 (WDFW 2014). The majority of wolf territories are located in northeast and north central Washington with two additional territories located in the far southeast part of the state. They have dispersed from adjacent populations in Idaho, Montana, Oregon, and British Columbia.

The gray wolf was listed as an endangered species under the Endangered Species Act in 1974 (39 CFR 1171). Since that time, the species has recovered in much of its range, and wolves in eastern Washington, considered part of the Northern Rocky Mountain Distinct Population Segment, were delisted in 2008 (USFWS 2008b). Numerous court actions have since changed the listing status, and the eastern Washington wolf population currently remains delisted. In 2011, a status review was initiated to evaluate the Pacific Northwest population of wolves, but was found not to constitute a DPS in 2013 (USFWS 2011c, USFWS 2013c). Wolves in western Washington, including any that may occupy MORA or NOCA, remain listed as an endangered species, however it is proposed for delisting (USFWS 2014c).

***Mount Rainier National Park***

Gray wolves are considered extirpated in MORA, with the last confirmed presence reported in 1933 (Macy 1934, cited in Wiles et al. 2011). Up until the 1920's, the National Park Service was engaged in predator control in MORA, probably contributing to their extirpation (Cahalane 1939). During 1995 and 1996, limited calling surveys were conducted in the park, with negative results (MORA park files). Winter forest carnivore surveys also were unsuccessful in documenting wolves (Reid et al. 2010). Observations of individual wolves have been reported in MORA on occasion; however, none were verifiable (i.e., had associated photo, carcass, or DNA; MORA wildlife observation files).

Two packs of wolves, the Teanaway and the Wenatchee packs, are well within dispersal distance to MORA (http://wdfw.wa.gov/conservation/gray_wolf/, accessed 24 April 2014). The known home range of the Teanaway pack is within 50 km of MORA boundaries (Becker et al. 2013). The home range of the Wenatchee pack is not yet known, however its estimated location is within 80 km of MORA boundaries. In Montana, re-colonizing wolves dispersed on average 78 km (females) to 118 km (males) (Boyd and Pletscher 1999). One notable female dispersed 840 km. MORA provides summer range to two elk herds (North and South Rainier herds). Recent aerial surveys have documented almost 1,000 elk using high elevation summer range in MORA (Happe et al. 2013). Although no estimates of blacktailed and mule deer exist in the park, they are common at low and middle elevations. With abundant prey and protected lands, it is likely that wolves will expand into the park in the near future.

***North Cascades National Park Complex***

Unverified observations of individual wolves have been reported in and adjacent to NOCA with increasing frequency over the past two decades. The first wolf pack in recent time (Lookout pack) was

documented to the east of the park boundary in 2008. Wolf tracks and occasional sightings have since been observed in the eastern part of the Lake Chelan National Recreation Area and are presumably from individuals of this pack.

Wolf activity has also been reported in the Hozomeen area of Ross Lake National Recreation Area for the past several years. Evidence from photos, tracks, and scat suggest a small wolf pack inhabits this area primarily during winter and early spring periods. During late April and early May 2011, NPS and WDFW biologists spent 28 days trapping for wolves in the area in an attempt to put a radio collar on at least one animal to learn details of their movement and land use patterns. Trapping efforts produced no captures, despite abundant wolf sign (tracks, scat) observed in the area. More recently, tracks of at least three wolves were photographed, side by side, during early spring 2012 in the Hozomeen area (NOCA park files). Given their capability for long-distance movement, it is possible this pack may occupy an expansive area to the north of the park boundary in British Columbia and/or to the east on USFS lands. NOCA and WDFW biologists are continuing monitoring efforts to learn more about abundance and seasonal use patterns of wolves using this area.

Key habitat components for wolves include: a sufficient year-round ungulate prey base coupled with the availability of other prey species (mid-sized mammals); suitable, fairly secluded denning and rendezvous sites; and minimal exposure to human activity (USFWS 1987). Most of NOCA comprises suitable habitat for wolves. The State recovery plan for wolves calls for at least four wolf packs in the Northern Cascades region (Wiles et al. 2011), and wolf packs appear to be increasing in number on the whole statewide. The region near NOCA is well positioned for wolf pack occupancy because of proximity to British Columbia sources and wolves colonizing from northern Idaho and Eastern Washington.

### Effects of the proposed fisher restoration project

*Release Actions:* Potential effects on gray wolves include disturbance at dens or rendezvous sites. As there are no known wolves, dens, or rendezvous sites present in the fisher release areas in either MORA or NOCA, fisher release actions would have no effect on wolves.

*Post Release Monitoring:* Again, potential effects on gray wolves include disturbance at dens or rendezvous sites. There are currently no known active wolf dens or rendezvous sites in the parks. Although ground-based monitoring activities would have no impact on wolves beyond current visitation patterns, fixed-wing aircraft associated with aerial telemetry could temporarily disturb gray wolves that are present in the parks at the time of flights. However, flights would be limited to five times per month and would be restricted to elevations greater than 111 yards above tree canopy. Consequently, fisher monitoring actions are not likely to adversely affect wolves.

*Indirect effects of a reintroduced fisher population:* The establishment of a self-sustaining population of fishers is not expected to affect gray wolves. Gray wolves are currently rare or non-existent west of the Cascades crest where fishers would be reintroduced and would likely become established. As wolves eventually expand their geographic range and recolonize historical areas, there could be interactions between wolves and fishers on the west side of the crest. Competition for prey is possible but discountable, as wolves prey mostly on ungulates and small mammals are usually of low importance (Wiles et al. 2011). It is possible wolves could prey on fishers, but given the low density of each species, encounters should be rare. Because the effects of a reintroduced fisher population are expected to be discountable and insignificant, the restoration of fishers "may affect but is not likely to adversely affect" gray wolves.

In summary, the three phases of the proposed fisher restoration are expected to either have no effect, or to be extremely unlikely to affect gray wolves. Given these considerations, the proposed reintroduction of fishers "may affect but is not likely to adversely affect" gray wolves.

### Critical Habitat

No critical habitat has been formally designated within the two parks for gray wolves, although the parks contain some high-quality habitat. Therefore, there would be no effect to critical habitat for gray wolves.

## Canada Lynx (Federal Threatened)

### Background

Canada lynx are medium-sized cats, generally measuring 75-90 cm long and weighing 8 to 10.5 kg (Quinn and Parker 1987). They have large, well-furred feet and long legs for traversing deep snow; tufts on their ears; and short, black-tipped tails. Lynx are morphologically and physiologically adapted for hunting snowshoe hares and surviving in areas that have cold winters with deep, soft snow for extended periods. Because of the patchiness and temporal nature of high-quality snowshoe hare habitat, lynx populations require large boreal forest landscapes to ensure that sufficient high-quality snowshoe hare habitat is available and to ensure that lynx may move freely among patches of suitable habitat and among subpopulations of lynx.

The Canada lynx was listed as threatened in the contiguous United States on March 24, 2000 (USFWS 2000). Critical habitat for the species was designated in 2006, and a proposed rule for revision of critical habitat was issued in 2013 (USFWS 2013a). Canada lynx are specialized predators and their distribution coincides with the snowshoe hare. Young, dense conifer and older, multi-storied stands are two important vegetation conditions essential to lynx because they support conditions suitable for higher densities of snowshoe hares (Buskirk et al. 2000).

Records to date (McKelvey et al. 2000, Koehler et al. 2008, Maletzke et al. 2008) suggest that in the Cascade Mountains, lynx are found only on the east side of the range in Washington. Koehler (1990) reported lynx in the North Cascades denned in mature (older than 250 years) stands with an overstory of Engelmann spruce, subalpine fir, and lodgepole pine with an abundance of downed woody debris to provide security and thermal cover for kittens. This cover type is normally found at mid to upper forested elevations and typically east of the Cascade crest.

#### *Mount Rainier National Park*

MORA provides limited habitat for lynx. Taylor and Shaw (1927) included lynx as residents of MORA, however Stinson (2001) raises doubts, adding that snowshoe hares are rare or absent from much of MORA, and the habitat types in MORA are more similar to the wetter western Washington types than where lynx are usually found in the northeastern-most portion of the Washington Cascades. MORA evaluated potential lynx habitat using GIS in preparation for surveys, and concluded that lynx habitat was patchily distributed in the park (MORA park files). Hair-snare surveys based on the National Lynx Detection Protocol (McKelvey et al. 1999) were conducted in MORA during the summers of 2000-2002. No lynx hair was collected (MORA park files). Limited snow tracking surveys were conducted in likely lynx habitat in 2000-2001; however, no lynx tracks were recorded (MORA park files). Parkwide remote-camera carnivore surveys during the winters of 2001-2002 failed to detect any lynx, despite detecting numerous other forest carnivores (Reid et al. 2010).

### *North Cascades National Park Complex*

In 2006, the U.S. Fish and Wildlife Service designated a portion of the North Cascades National Park Service Complex (Unit 4, North Cascades Unit) as critical habitat for lynx (USFWS 2006). Lynx critical habitat includes the portions of the Complex within Chelan County east of the Cascade Crest above 1,575 m in elevation.

The eastern portions of NOCA are part of the Okanogan lynx management zone (LMZ), the largest in Washington. Lynx population stability in the northeastern Cascades probably depends on immigrants from British Columbia (Stinson 2001). Lynx have been observed on rare occasions in the Stehekin Valley and along Highway 20 (NOCA wildlife database). Recently, lynx were detected with remote cameras in the Hozomeen area, near the US/Canada border during the winter of 2011-12 (NOCA wildlife files). Lynx populations in the Okanogan LMZ have declined since the 1970s, and were estimated at 50 individuals in 2001 (Stinson 2001).

### Effects of the proposed fisher restoration project

*Release Actions:* Lynx critical habitat has been designated east of the Cascades crest and most all verified lynx observations in NOCA are also east of the crest. Fisher release areas in NOCA have been selected at sites west of the Cascade crest and the use of helicopters is not anticipated for any releases. Given the spatially distinct nature of fisher release site and known lynx occurrence, fisher release actions should have no effect on lynx.

*Post Release Monitoring:* The use of vehicles on park roads and foot access on trails during monitoring efforts would not disturb lynx that potentially inhabit the surrounding areas as it would not produce noise above existing ambient levels. An exception to this may be activities around a den site that may cause abandonment of the site, possibly affecting kitten survival (Ruggiero et al. 2000). Current research indicates lynx may tolerate limited disturbance, even around active dens, but the level of tolerance is unknown. In general, due to differences in habitat preferences, ground monitoring activities would be minimal in lynx habitat.

Fixed-wing aircraft would be used during monitoring efforts to gather radio telemetry data, which could disturb lynx. However, flights would be limited to five times per month and would be limited to elevations greater than 111 yards above tree canopy. Additionally, due to difference in habitat preferences, flight activities would be limited over lynx habitat. Consequently, fisher monitoring actions are not likely to adversely affect lynx.

*Indirect effects of a reintroduced fisher population:* Fishers and lynx coexisted prior to the extirpation of the fisher, and it is anticipated that the two species would interact as they did previously.

Both fishers and lynx prey on snowshoe hares and red squirrels, so there may be competition for food resources. In Washington, Koehler (1990) found that the red squirrel was an important alternate food source for lynx during times of hare shortage. However, Koehler (1990) concluded that lynx populations appear to be limited by the availability of snowshoe hare prey, particularly during the winter months.

Their different foraging strategies and use of habitats may reduce opportunities for competition for prey between these species. Lynx are adapted to travel in deep soft snow conditions during the winter, which fisher tend to avoid. On the east side of the Cascades, lynx use the subalpine and high elevation mixed-conifer zones above 1220 m (Stinson 2001), whereas fishers are associated with low to mid elevation coniferous or mixed deciduous-coniferous forests (Aubry and Raley 2006, Zielinski et al. 2006, Weir

2007). The observed differences in habitat use would reduce the likelihood of significant competition for prey.

In Maine, fishers were found to be a significant predator on lynx (Vashon et al. 2012). The Maine lynx population, however, was still expanding, so fishers were not limiting the population. High predation rates by fishers have not been observed among western populations (Interagency Lynx Biology Team 2013). From a species context, the most commonly reported causes of mortality are starvation, especially of kittens, and human-caused mortality (Interagency Lynx Biology Team 2013). It is certainly possible that the reintroduced fisher population in the North Cascades may prey on lynx. The impact on lynx is lessened by the low densities of both species, which reduces the chance of any interactions, and the different habitat preferences of the two species.

Because the effects of a reintroduced fisher population are expected to be discountable and insignificant, the restoration of fishers is not likely to adversely affect lynx.

In summary, the three phases of the proposed fisher restoration are expected to either have no effect, or to be extremely unlikely to affect lynx. Given these considerations, the proposed reintroduction of fishers "may affect but is not likely to adversely affect" Canada lynx.

### Critical Habitat

Critical habitat has been formally designated for lynx as Unit 4 in the North Cascades (USFWS 2013a). This unit supports the highest densities of lynx in Washington (Stinson 2001). Unit 4 consists of 5,176 $km^2$ located in north-central Washington in portions of Chelan and Okanogan Counties and includes areas mostly in the Okanogan-Wenatchee National Forest, North Cascades National Park, as well as BLM lands in the Spokane District and Loomis State Forest lands. Of the total designated critical habitat, approximately 348.1 $km^2$ (12.6 percent) lie within NOCA, all of which rests along or east of the Cascades crest.

No habitat would be modified through the course of the fisher reintroduction. Thus, the reintroduction of fishers would have no effect on critical habitat.

## CONCLUSION AND DETERMINATIONS

| Common Name | Scientific Name | Effect Determination |
|---|---|---|
| **Marbled murrelet** | *Brachyramphus marmoratus* | May affect, not likely to adversely affect |
| **Northern spotted owl** | *Strix occidentalis caurina* | May affect, not likely to adversely affect |
| **Grizzly bear (NOCA)** | *Ursus arctos horribilis* | May affect, not likely to adversely affect |
| **Gray wolf (NOCA)** | *Canus lupus* | May affect, not likely to adversely affect |
| **Canada lynx (NOCA)** | *Lynx canadensis* | May affect, not likely to adversely affect |

## CONSERVATION MEASURES

- Fishers would not be released during marbled murrelet and northern spotted owl nesting seasons.
- All fixed-wing radio telemetry flights would be at flight elevations greater than 111 yards above tree canopy (most would be greater).
- Landscapes selected by fishers would be mapped and evaluated to assess assumptions made on predicted elevation and habitat selection patterns of restored fisher population, and the degree of overlap with northern spotted owls and lynx.
- Crews working on field projects would record signs of fisher presence and activity.
- If wolf dens or rendezvous sites are encountered during field monitoring of fishers, activities would be restricted to outside 0.8 km (0.5 mile) of den or rendezvous sites.

## LIST OF PREPARERS

Dr. Patti Happe, Wildlife Branch Chief, Olympic National Park

Mason Reid, Wildlife Ecologist, Mount Rainier National Park

Roger Christophersen, Wildlife Biologist, North Cascades National Park Complex

Jeff Lewis, Wildlife Biologist, Washington Department of Fish and Wildlife

## REFERENCES


ABR, Inc. 2005. Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

ABR, Inc. 2008. Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

ABR, Inc. 2009. Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

Agee, J.K., and J. Kertis. 1986. Vegetation cover types of the North Cascades. National Park Service Cooperative Park Studies Unit, College of Forest Resources, Univ. of Washington, Seattle. 64 pp + map.

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.B. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.B. Gerhardt, S.A. Gremel, R.J. Gutierrez, P. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern. 2006. Status and trends in demography of northern spotted owls, 1985-2003. Wildlife Monographs 163.

Arjo, W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary overlap between wolves and coyotes in northwestern Montana. Journal of Mammalogy 83:754-766.

Arthur, S. M. and W. B. Krohn. 1991. Activity patterns, movements, and reproductive ecology of fishers in south-central Maine. J. Mammalogy 72:379-85.

Aubry, K. B. and D. B. Houston. 1992. Distribution and status of the fisher (Martes pennanti) in Washington. Northwest Naturalist 73:69-79.

Aubry, K. B. and J. C. Lewis. 2003. Extirpation and reintroduction of fishers (Martes pennanti) in Oregon: implications for their conservation in the Pacific states. Biological Conservation 114:79-90.

Aubry, K. B. and C. M. Raley. 2002 Ecological characteristics of fishers in the southern Oregon Cascade Range. Final Progress Report. U.S. Forest Service, Pacific Northwest Research Station, Olympia, Washington.

Aubry, K. B. and C. M. Raley. 2006. Ecological characteristics of fishers (Martes pennanti) in the southern Oregon Cascade range. Update: July 2006. USDA Forest Service, Pacific Northwest Research Station, Olympia Forestry Sciences Laboratory, Olympia, WA.

Bagnall, K.E. 2012. Spotted owl monitoring in Mount Rainier National Park. 2012 Annual Report. Unpublished report, Mount Rainier National Park, Longmire, WA. 11pp.

Bagnall, K.E. 2013. Spotted owl monitoring in Mount Rainier National Park. 2013 Annual Report. Unpublished report, Mount Rainier National Park, Longmire, WA. 11pp.

Banci, V. 1994. Wolverine. Pages 99-127 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, editors. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the western United States. U.S. Forest Service General Technical Report RM-254.

B.C. Ministry of Environment. 2012. Draft Management Plan for the Grey Wolf (*Canis lupus*) in British Columbia. Ministry of Forests, Lands and Natural Resource Operations, Victoria, B.C. 50 Pp.

Becker, S.A., P.F. Frame, D. Martorello, and E. Krausz. 2013. Washington Gray Wolf Conservation and Management 2012 Annual Report. Pages WA-1 to WA-16 *in* U.S. Fish and Wildlife Service Rocky Mountain Wolf Program 2012 Annual Report. USFWS, Helena, Montana.

Boyd, D.K and D.H. Pletscher. 1999. Characteristics of Dispersal in a Colonizing Wolf Population in the Central Rocky Mountains. Journal of Wildlife Management, 63:1094-1108.
Boyd, D. K., R. R. Ream, D. H. Pletscher, and M. W. Fairchild. 1994. Prey taken by colonizing wolves and hunters in the Glacier National Park area. Journal of Wildlife Management 58(2):289-295.
Buck, S. G, C. Mullis, and A. Mossman. 1983. Corral Bottom/ Hayfork Bally fisher study. U.S. Forest Service and Humboldt State University, Arcata, CA.
Buskirk, S.W. L.F. Ruggiero, K.B. Aubry, D.E. Pearson, J.R. Squires, and K.S. McKelvey. 2000. Comparative ecology of lynx in North America. Pages 397-417 In L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, and others. Ecology and conservation of lynx in the United States. Univ. of Colorado Press. 480 pp.
Cahalane, V.H. 1939. The evolution of predator control policy in the national parks. Journal of Wild. Manage. 3(3).
Carey, A.B. 1995. Sciurids in Pacific Northwest managed and old-growth forests. Ecological Applications 5(3):648-661.
Coulter, M. W. 1966. The ecology and management of Fishers in Maine. Dissertation, State University, College of Forestry at Syracuse University, NY.
Courtney, S. P., J. A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A. B. Franklin, R.J. Gutierrez, J. M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the Northern Spotted Owl. Sustainable Ecosystems Institute.
Christophersen, R. G. 2006. Supplemental forest carnivore surveys in North Cascades National Park Service Complex, Washington. USDI National Park Service. Sedro-Woolley, WA. NPS/PWR-NCCN/INV-2006/01. NPS D280. 30 p.
Christophersen, R. G., R. C. Kuntz II, and J. F. McLaughlin 2005. A survey of forest carnivore species composition and distribution in North Cascades National Park Service Complex, Washington. USDI National Park Service. Sedro Woolley, WA. NPS/PWR-NCCN/INV-2005/01. NPS D-271. 48 p.
Darimont, C.T. and P.C. Paquet. 2000. The gray wolves (*Canis lupus*) of British Columbia's coastal rainforests: findings from year 2000 pilot study and conservation assessment. Prepared for Raincoast Conservation Society, Victoria, BC.
Darimont, C. T., T. E. Reimchen, and P. C. Paquet. 2003. Foraging behavior by gray wolves on salmon streams in coastal British Columbia. Canadian Journal of Zoology 81:349-353.
Darimont, C. T., M. H. H. Price, N. N. Winchester, J. Gordon-Walker, and P. C. Paquet. 2004. Predators in natural fragments: foraging ecology of wolves in British Columbia's central and north coast archipelago. Journal of Biogeography 31:1867-1877.
Darimont, C. T., P. C. Paquet, and T. E. Reimchen. 2008. Spawning salmon disrupt trophic coupling between wolves and ungulate prey in coastal British Columbia. BMC Ecology 8:14 (12 pp).
Dark, S. A. 1997. A landscape scale analysis of mammalian carnivore distribution and habitat use by fisher. M.S. Thesis. Humboldt State Univ., CA.
Dark, S. J., R.J. Gutierrez, and G.I.J. Gould. 1998. The barred owl (Strix varia) invasion in California. The Auk 115(1):50-56
Davis, R. J., K. M. Dugger, S. Mohoric, L. Evers, W. C. Aney. 2011. Northwest Forest Plan—the first 15 years (1994–2008): Status and trends of northern spotted owl populations and habitats. Gen. Tech. Rep. PNW-GTR-850. U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 147 p.
deVos, A. 1952. Ecology and management of fisher and marten in Ontario. Tech. Bull. Ontario Dept. Lands and Forests
Douglas, C. W., and M. A. Strickland. 1987. Fisher. Pages 511-529 in M. Novak, J. A. Baker, M.E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in NorthAmerica. Ontario Ministry of Natural Resources and the Ontario Trappers Association, Toronto, Ontario.
Dhundale, J. 2009. Mount Rainier National Park marbled murrelet 2009 progress report. Mount Rainier National Park, Ashford, WA. 23 pp.
Forsman, E. D., E. C. Meslow, and H. M. Wight. 1984. Distribution and Biology of the Spotted Owl in Oregon. Wildlife Monograph No. 87.

Forsman, E. D., I. A. Otto, S. G. Sovern, M. Taylor, D. W. Hayes, H. Allen, S. Roberts, and E. Seaman. 2001. Spatial and temporal variation in diets of spotted owls in Washington. J. Raptor Res. 35:141-150.

Forsman, E. D., R. G. Anthony, K. M. Dugger, E. M. Glenn, A. B. Franklin, G. C. White, C. J. Schwarz, K. P. Burnham, D. R. Anderson, J. D. Nichols, J. E. Hines, J. B. Lint, R. J. Davis, S. H. Ackers, L. S. Andrews, B. L. Biswell, P. C. Carlson, L. V. Diller, S. A. Gremel, D. R. Herter, J. M. Higley, R. B. Horn, J. A. Reid, J. Rockweit, J. Schaberl, T. J. Snetsinger, and S. G. Sovern. 2011. Population demography of northern spotted owls: 1985–2008. Studies in Avian Biology 40. Cooper Ornithological Society.

Fritts, S.H. and L.D. Mech. 1981. Dynamics, Movements, and Feeding Ecology of a Newly Protected Wolf Population in Northwestern Minnesota. Wildlife Monographs. Pp. 3-79.

Frost, H.C., W.B. Krohn, and C. R. Wallace. 1997. Age-specific reproductive characteristics in fishers. Journal of Mammalogy 78(2):598-612.

Gaines, W.L. 2004. Black Bear, Ursus americanus, Denning Chronology and Den Site Selection in the Northeastern Cascades of Washington. Canadian Field Naturalist 117: 626-633.

Gese, E. M., and L. D. Mech. 1991. Dispersal of wolves (*Canis lupus*) in northeastern Minnesota, 1969-1989. Canadian Journal of Zoology 69:2946-2955.

Golightly, R. T., T. F. Penland, W. J. Zielinski, and J. M. Higley. 2006. Fisher diet in the Klamath/North Coast Bioregion. Unpublished report, Department of Wildlife, Humboldt State University, Arcata, California.

Grenfell, W. E., and M. Fasenfest. 1979. Winter food habits of fisher (Martes pennanti) in northwestern California. California Fish and Game 65(3):186-189

Gutierrez, R.J., A. B. Franklin, and W. S. LaHaye. 1995. Spotted owl (Strix occidentalis) in The Birds of North America, No. 179 (A. Poole and F. Gill, eds.), The Academy of Natural Sciences, Philadelphia, Pennsylvania and the American Ornithologists' Union, Washington D.D.

Hall, E. R. 1942. Gestation period in the fisher with recommendations for the animal's protection in California. California Fish and Game 28(3):143-147.

Hamer, T. E. 1988. Home range size of the Northern Barred owl and Northern Spotted owl in western Washington. M.S. Thesis, Western Washington University, Bellingham, WA.

Hamer Environmental. 2000. Mount Rainer National Park contracted marbled murrelet field survey results. Mount Rainier National Park, Ashford, WA.

Hamer Environmental. 2009. Use of Radar to Determine the Presence/Absence of Marbled Murrelets in North Cascades National Park, Washington. 32 pp.

Hayes, G. E., and J. C. Lewis. 2006. Washington State Recovery Plan for the Fisher. Washington Department of Fish and Wildlife, Olympia. 62 pp.

Hanauska-Brown, L., L. Bradley, J. Gude, N. Lance, K. Laudon, A.Messer, A. Nelson, M. Ross, and J. Steuber. 2012. Montana Gray Wolf Conservation and Management 2011 Annual Report. Montana Fish, Wildlife & Parks. Helena , Montana. Pp54.

Happe, P. J., M. Reid, D. J. Vales, B. J. Moeller, M. Tirhi, and S. McCorquodale. 2013. Mount Rainier National Park and Olympic National Park elk monitoring program annual report 2012. Natural Resource Data Series NPS/NCCN/NRDS—2013/456. National Park Service, Fort Collins, Colorado.

Hatler, D.F., D.W. Nagorsen, and A.M. Beal. 2008. Carnivores of British Columbia. Royal British Columbia Museum, Victoria, BC.

Hershey, K. T., E. C. Meslow, and F. L. Ramsey. 1998. Characteristics of Forests at Spotted Owl Nest Sites in the Pacific Northwest. Journal of Wildlife Management 62:1398–1410.

Higley, J. M. and S. Matthews 2006. Demographic rates and denning ecology of female Pacific fishers (Martes pennanti) in northwestern California: preliminary report October 2004-July 2006. Hoopa Tribal Forestry, Hoopa, CA.

Hodgson, R. G. 1937. Fisher farming. Fur Trade Journal of Canada. Toronto, Ontario, Canada.

Hoffman, R. L., A. Woodward, P. Haggerty, K. Jenkins, P. Griffin, M. J. Adams, J. Hagar, T. Cummings, D. Duriscoe, K. Kopper, J. Riedel, L. Marin, G. S. Mauger, K. Bumbaco, and J. S. Littell. (in prep). North Cascades National Park Service Complex: Natural Resource Condition Assessment. Natural Resource Report NPS/NRSS/WRD/NRR—20xx/xxx. National Park Service, Fort Collins, Colorado.

Huggard, D. J. 1993. Prey selectivity of wolves in Banff National Park. I. Prey species. Canadian Journal of Zoology 71:130-139.

Interagency Grizzly Bear Committee. 2011. North Cascades grizzly bear sighting. IAGBT North Cascades Grizzly Bear Subcommittee, July 1, 2011.

Interagency Lynx Biology Team. 2013. Canada lynx conservation assessment and strategy. 3rd edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-13-19, Missoula, MT. 128 pp.

Jenkins, K. J. and P. J. Happe. 2013. Sampling Design and Field Protocols for Non-invasive Fisher Surveys on the Olympic Peninsula, Washington. Administrative Report to Olympic National Park. U.S.Geological Survey, Port Angeles, WA.

Jones, J. L. 1991. Habitat use of fishers in north-central Idaho. Thesis, University of Idaho, Moscow.

Kelly, E. G. 2001. The range expansion of the Northern Barred Owl: An evaluation of the impact on Spotted Owls. MS Thesis, Oregon State University, Corvallis, OR.

Kelley, G. M. 1977. Fisher (Martes pennanti) biology in White Mountain National Forest and adjacent areas. PhD. Thesis, University of Massachusetts, Amherst.

Koehler, G.M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology, 68:845-851.

Koehler, G. M., B. T. Maletzke, J. A. Von Kienast, K. B. Aubry, R. B. Wielgus, and R. H. Naney. 2008. Habitat fragmentation and the persistence of lynx populations in Washington state. Journal of Wildlife Management 72: 1518-1524.

Krohn, W. B., S. M. Arthur, and T. F. Paragi. 1994. Mortality and vulnerability of a heavily trapped fisher population. In S. W. Buskirk, A. Harestad, M. Raphael ,eds. Martens, sables and fishers: biology and conservation. Ithaca, NY: Cornell Univ. Press: 137-145

Krohn, W. B., K. D. Elowe, and R. B. Boone. 1995. Relation among fishers, snow, and martens: development and evaluation of two hypotheses. The Forestry Chronicle 71: 97-105.

Kunkel, K. E., T. K. Ruth, D. H. Pletscher, and M. G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park, Montana. Journal of Wildlife Management 63(3):901-910.

Kuntz, R. C., and R. G. Christophersen. 1996. A Survey of Northern Spotted Owls in North Cascades National Park Service Complex, Washington. NRTR-96/05. Natural Resources Technical Report Series, NPS Denver Service Center, Denver, CO 80225.

Leonard, R.D. 1980. The winter activity and movements, winter diet, and breeding biology of the fisher (Martes pennanti) in southeastern Manitoba. M.S. Theses, University of Manitoba. 181 pp.

Leskiw, T., and R. J. Gutierrez . 1998. Possible predation of a spotted owl by a barred owl. Western Birds 29:225-226.

Lewis, J. C. 2013. Implementation plan for reintroducing fishers to the Cascade mountain range in Washington. Washington Department of Fish and Wildlife, Olympia, WA. 29 pp. Available at: http://wdfw.wa.gov/publications/01556/.

Lewis, J.C. 2014. Post-release movements, survival, and resource selection of fishers (*Pekania pennanti*) translocated to the Olympic Peninsula of Washington. Ph.D. Dissertation. University of Washington, Seattle. 122pp.

Lewis, J. C. and G. E. Hayes. 2004. Feasibility Assessment for Reintroducing Fishers to Washington. Washington Department of Fish and Wildlife, Olympia, WA.

Lewis, J. C. and D. W. Stinson. 1998. "Washington State Status Report for the Fisher." Washington Department of Fish and Wildlife, Olympia, WA. Cited in Jeffrey C. Lewis and Gerald E. Hayes. 2004. Feasibility Assessment for Reintroducing Fishers to Washington. Washington Department of Fish and Wildlife, Olympia, WA.

Lewis, J.C., P.J. Happe, and K. J. Jenkins, D. J. Manson. 2010. Olympic Fisher Reintroduction Project: 2009 Progress Report. Available at http://wdfw.wa.gov/publications/00812/.

Lewis, J. C., P. J. Happe, K. J. Jenkins, and D. J. Manson. 2011. Olympic Fisher Reintroduction Project: 2010 Progress Report. Washington Department of Fish and Wildlife, Olympia, Washington. Available at: http://wdfw.wa.gov/publications/01186/.

Lewis, J. C., P. J. Happe, K. J. Jenkins, and D. J. Manson. 2012. Olympic fisher reintroduction project: progress report 2008-2011. Washington Department of Fish and Wildlife, Olympia, Washington. Available at: http://wdfw.wa.gov/publications/01393/.

Long, R.A., J.S. Begley, P. MacKay, W.L. Gaines, and A.J. Shirk. 2013. The Cascades Carnivore Connectivity Project: A landscape genetic assessment of connectivity for carnivores in Washington's North Cascades Ecosystem. Final report for the Seattle City Light Wildlife Research Program, Seattle, Washington. Western Transportation Institute, Montana State University, Bozeman. 57 pp.

Mack, C. M. and K. Laudon. 1998. Idaho wolf recovery project: recovery and management of gray wolves in Idaho. Annual Report 1995-1998. Nez Perce Tribe, Department of Wildlife Management, Lapwai, ID. 19pp.

Maletzke, B. T. 2004. Winter habitat selection of lynx (Lynx canadensis) in northern Washington. M.S. Thesis, Washington State University, Pullman. 39 pp.

Maletzke, B. T., G. M. Koehler, R .B. Wielgus, and K .B. Aubry. 2008. Habitat conditions associated with lynx hunting behavior during winter in Northern Washington. Journal of Wildlife Management 72:1473–1478.

Maser, C., B.R. Mate, J. F. Franklin, and C.T. Dyrness. 1981. Natural history of Oregon coast mammals. Gen. Tech. Rept. PNW-133. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR. 496 pp.

McKelvey, K.S., J.J. Claar, G.W. McDaniel, and G. Hanvey. 1999. National lynx detection protocol. U.S. Department of Agriculture, Rocky Mountain Research Station, Missoula, MT.

Mech, L. D. 1970. The wolf: the ecology and behavior of an endangered species. University of Minnesota Press, Minneapolis. 384pp.

Mech, L.D. 1974. Canis lupus. Mammalian Species. No. 37:1-6.

Mech, L.D. 1995. The challenge and opportunity of recovering wolf populations. Conservation Biology 9:270–278.

Mech, L.D., L.G. Adams, T.J. Meier, J.W. Burch, and B.W. Dale. 1998. The Wolves of Denali. University of Minnesota Press, Minneapolis. 227 pp.

Mech, L.D. and L. Boitani. 2003. Wolf social ecology. Pages 1–34 *in* L.D. Mech and L. Boitani, eds. Wolves: behavior, ecology and conservation. University of Chicago Press, Chicago, IL.

Moen, R. 2009. Canada Lynx in the Great Lakes Region 2008 Annual Report. NRRI Technical Report No.NRRI/TR-2009-06, Release 1.0, 1-34.

Myers, E.G. 2009. Mount Rainier National Park Northern Spotted Owl Demographic Monitoring, Draft 2009 Progress Report. Mount Rainier National Park, Ashford, WA.

NPS. 2006. Management Policies 2006. Washington, DC. Available at < http://www.nps.gov/policy/MP2006.pdf >.

NPS. 2007. Olympic National Park Fisher Reintroduction Plan /Environmental Assessment. Olympic National Park, Olympic, WA.

NPS 2012. Revisiting Leopold: Resource Stewardship in the National Parks. A Report of the National Park System Advisory Board Science Committee. Washington, D.C. Available at < http://www.nps.gov/calltoaction/PDF/LeopoldReport_2012.pdf>

Nelson, S. K., M. H. Huff, S. L. Miller, M. G. Raphael. 2006. Marbled murrelet biology: habitat relations and populations. In: Huff, M. H.; Raphael, M. G.; Miller, S.L.; Nelson, S.K.; Baldwin, J., tech cords. Northwest Forest Plan-The first 10 years (1994-2003): status and trends of populations and nesting habitat for the marbled murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR:U.S. Dept. of Agriculture, Forest Service, Pacific Northwest Research Station: 9-30. Chapter 2.

Paquet, P.C. and L.N. Carbyn. 2003. Gray wolf (*Canis lupus* and allies). Pages 482-510 *in* G.A. Feldhamer, B.C., Tompson, and J.A. Chapman, ed. Wild mammals of North America: Biology, management, and conservation. Second edition. The John Hopkins University Press, Maryland.

Paragi, T. F. 1990. Reproductive Biology of Female Fishers in Southcentral Maine. M.S. Thesis, University of Maine, Orono.

Paragi, T. F., S. M. Arthur, and W. B. Krohn. 1996. Importance of tree cavities as natal dens for fishers. Northern Journal of Applied Forestry 13(2):79-83

Person, D. K., M. Kirchhoff, V. Van Ballenberghe, G. C. Iverson, and E. Grossman. 1996. The Alexander Archipelago wolf: a conservation assessment. General Technical Report PNWGTR-384, Pacific Northwest Research Station, USDA Forest Service, Portland, Oregon.

Pearson, S.F., M.G. Raphael, M.M. Lance, and T. D. Bloxton, Jr. 2011. Washington 2010 at-sea marbled murrelet population monitoring: Research Progress Report. Washington Department of Fish and Wildlife, Wildlife Science Division and USDA Forest Service Pacific Northwest Research Station, Olympia, WA.

Powell, R. A. 1980. Fisher arboreal activity, Canadian Field Nat. 94:90-91.

Powell, R. A. 1981. Hunting behavior and food requirements of the fisher (martes pennanti). Proceedings worldwide furbearer conference.

Powell, R. A. 1993. The Fisher: Life History, Ecology, and Behavior. 2nd ed. Minneapolis: University of Minnesota Press.

Powell, R. A. and W. J. Zielinski. 1994. "Fisher." In The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States, edited by L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, 28–73. General Technical Report RM-254. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Quinn, N. W. S. and G. Parker. 1987. Lynx. Pages 683-694 in M. Novak, J.A. Barber, M.E. Obbard, B. Malloch (eds.). Wild furbearer management and conservation in North America. Ontario Ministry of Natural Resources.

Raedeke Associates. 2013. Rainier spotted owl demography study area. Annual report 2013. Raedeke Associates, Inc., Seattle, WA. 47pp.

Raine, R. M. 1987. Winter food habits and foraging behavior of fishers (Martes pennanti) and martens (Martes americana) in southeastern Manitoba. Can. J. Zool. 65: 745-747.

Raley, K.M., E.C. Lofroth, R.L. Truex, J.S. Yaeger, and J.M. Higley. 2012. Habitat ecology of fishers in western North America, pages 231-254 in K.B. Aubry, W.J. Zielinski, M.G. Raphael, G. Proulx, and S.W. Buskir (eds.). Biology and Conservation of Martens, Sables, and Fishers. Cornell University Press, Ithaca, NY.

Raphael, M. 2007. Investigators annual report to Olympic National Park: Research Permit No. OLYM-2007-SCI-00, Study No. OLYM-160 NPS files. Unpublished report.

Raphael, M.G., G.M. Gelleher, M.H. Huff, S.L. Miller, S.K. Nelson, and R. Young. 2006. Spatially-explicit estimates of potential nesting habitat for the marbled murrelet. Chapter 5 in: Marbled Murrelet Effectiveness Monitoring Team; M. Huff, Tech. Coord. Northwest Forest Plan – The first 10 years (1994- 2003): Status and trend of populations and nesting habitat for the marbled murrelet. Gen. Tech. Report. PNW-GTR-650. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

Reid, M., J. Petterson, and J. Schaberl. 2010. A survey of forest carnivores in Mount Rainier National Park, Washington: National Park Service, North Coast and Cascades Network. Natural Resource Technical Report NPS/NCCN/NRTR—2010/412. National Park Service, Fort Collins, Colorado.

Roy, K. D. 1991. Ecology of reintroduced fishers in the Cabinet Mountains of northwest Montana. M.S. Thesis, University of Montana, Missoula, MT.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S.McKelvey, and J.R. Squires. 2000. Ecology and conservation of lynx in the United States. Univ. of Colorado Press and USDA Rocky Mountain Research Station. 480 pp.

Schumaker, N. H. 1998. A user's guide to the PATCH model. EPA/600/R-98/135. U.S. EPA, Environmental Research Laboratory, Corvallis, OR.

Seglund, A. E. 1995. The Use of Resting Sites by the Pacific Fisher. M.S. Thesis, Humboldt State University, Arcata California.

Siegel, R. B., K. E. Jablonski, M. N. Scholer, R. C. Kuntz II, and R. L. Wilkerson. 2009b. Surveying for Spotted Owls on the east slope of North Cascades National Park Service Complex, 2007-2008. Natural Resource Technical Report NPS/NCCN/NRTR—2009/184. National Park Service, Fort Collins, CO.

Siegel, R. B., R. C. Kuntz II, R. L. Wilkerson, K. D. Kuhlman, and M. C. Toshack. 2012. Surveying for Spotted Owls in the Upper Skagit watershed of North Cascades National Park Complex, 2009–2010. Natural Resource Technical Report NPS/NOCA/NRTR—2012/597. National Park Service, Fort Collins, CO.

Smith, D. W., K. M. Murphy, and D. S. Guernsey. 2000. Yellowstone Wolf Project: Annual Report, 1999. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-NR-2000-01.

Smith, D. W. 1998. Yellowstone Wolf Project: Annual Report, 1997. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming. YCR-NR-98-2.

Steinberg, E.K. 1999. Diversification of genes, populations, and species: evolutionary genetics of real and virtual pocket gophers (Thomomys). Ph. D. Dissertation, University of Washington, Seattle. 157 pp.

Stinson, D. W. 2001. Washington state recovery plan for the lynx. Washington Department of Fish and Wildlife, Olympia, WA. 78 p.

Sumioka, S.S., D.L. Dreoch, K.D. Kasiuch. 1998. Annual precipitation for state of Washington, 1930-1957, in USGS WR Investigation Report 97-4277, Tacoma, Washighton. 91 pp.

Taylor, W. P., and W. T. Shaw. 1927. Mammals and birds of Mount Rainier National Park. U.S. Government Printing Office,Washington, D.C.

Thomas, J. W., E. D. Forsman, J. B. Lint, E. C. Meslow, B. R. Noon, and J. Verner. 1990. A Conservation Strategy for the Northern Spotted Owl. Report of the Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl." Portland, OR.

Truex, R. L., W. J. Zeilinski, R. T. Golightly, R. H. Barrett, and S. A. Wisely. 1998. A meta-analysis of regional variation in fisher morphology, demography, and habitat ecology in California. Final report to the California Department of Fish and Game. U.S. Forest Service, Pacific Southwest Research Station, Arcata, CA.

USFWS. 1987. Northern Rocky Mountain wolf recovery plan. U.S. Fish and Wildlife Service. Denver, Colorado. 119pp.

USFWS. 1990. Endangered and threatened wildlife and plants; determination of threatened status for the northern spotted owl. Fed. Reg. Vol. 55. 123: 26114-26194. June 26, 1990.

USFWS. 1994. The reintroduction of gray wolves to Yellowstone National Park and central Idaho: Final Environmental Impact Statement. U.S. Dept. of Interior Fish and Wildl. Serv., Denver, Colo.

USFWS. 1997. Recovery plan for the threatened marbled murrelet (Brachyramphus marmoratus) in Washington, Oregon, and California. U.S. Fish and Wildlife Service, Portland, Oregon. 203 pp.

USFWS. 1998 Final ESA Section 7 Consultation Handbook. Available at <http://www.fws.gov/endangered/consultations/ s7hndbk/apdx-c-h.pdf>.\

USFWS. 2000. Determination of Threatened Status for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Related Rule. Federal Register 65: 16051-16086.

USFWS. 2004. 12-month finding for a petition to list the west coast distinct population segment of the fisher (Martes pennanti ). Federal Register 69(68):18770-18792.

USFWS. 2006. Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx: final rule. Federal Register 71: 66008-66061.

USFWS. 2007.

USFWS. 2008a. Final recovery plan for the northern spotted owl, *Strix occidentalis caurina.* U.S. Fish and Wildlife Service, Portland, Oregon. xii + 142 pp.

USFWS. 2008b. Final rule designating the northern Rocky Mountain population of gray wolf as a distinct population segment and removing this distinct population segment from the federal list of endangered and threatened wildlife. Federal Register 73(39):10514-10560.

USFWS. 2011a. Grizzly Bear (Ursus arctos horribilis) Five Year Review: Summary and Evaluation. U.S. Fish and Wildlife Grizzly Bear Recovery Office, Missoula, Montana. 205 pp.

USFWS. 2011b. Revised Recovery Plan for the Northern Spotted Owl. Available at: http://www.fws.gov/oregonfwo/Species/Data/NorthernSpottedOwl/Recovery/Library/Documents/RevisedNSORecPlan2011.pdf

USFWS. 2011c. Proposed rule to revise the list of endangered and threatened wildlife for the gray wolf (*Canis lupus*) in the eastern United States, initiation of status reviews for the gray wolf and for the eastern wolf (*Canis lycaon*). Federal Register 76(87):26086-26145.

USFWS. 2013a. Biological opinion for effects to northern spotted owls, critical habitat for northern spotted owls, marbled murrelets, critical habitat for marbled murrelets, bull trout, and critical habitat for bull trout from selected programmatic forest management activities March 25, 2013 to December 31, 2023 on the Olympic National Forest, Washington. USFWS Reference: 13410-2009-F-0388. U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, Lacey, WA. 404 pp.

USFWS. 2013b. Removing the Gray Wolf (*Canis lupus*) From the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (*Canis lupus baileyi* ) by Listing It as Endangered; Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf; Proposed Rules. Federal Register 78: 35664-35719.

USFWS. 2013c. Revised Designation of Critical Habitat for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary; Proposed Rule. Federal Register 78: 59429-59474.

USFWS. 2014a. Species Profile for Marbled Murrelet: Life History. Available at < http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08C

USFWS. 2014b. Species Profile for Northern Spotted Owl. Available at < http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08B

USFWS. 2014c. Removing the Gray Wolf(Canis lupus) From the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered: Proposed rule; notice of availability and reopening of comment period. Federal Register 79:7627-7629.

USFWS, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2001. Rocky Mountain Wolf Recovery 2000 Annual Report. USFWS, Helena, MT. 35pp.

Vashon, J., S. McLellan, S. Crowley, A. Meehan, and K. Laustsen. 2012. Canada lynx assessment. Maine Department of Inland Fish and Wildlife, Research and Assessment Section, Bangor, ME.

Watts, D. E., L. G. Butler, B. W. Dale, and R. D. Cox. 2010. The Ilnik wolf (*Canis lupus*) pack: use of marine mammals and offshore sea ice. Wildlife Biology 16:144-149.

WDFW. 2013. 2013-2015 Strategic Plan, Goal 1, Objective C. Available at < http://wdfw.wa.gov/publications/01516/wdfw01516.pdf >

WDFW 2014. Wolf packs in Washington. Available at http://wdfw.wa.gov/conservation/gray_wolf/packs/.

Weaver, J. L. 1994. Ecology of wolf predation amidst high ungulate diversity in Jasper National Park, Alberta. Dissertation, University of Montana, Missoula.

Weir, R. D. 1995. Diet, spatial organization, and habitat relationships of fishers in south-central British Columbia. Thesis, Simon Frazier University, Burnaby, British Columbia.

Weir, R. D. 2003. Status of the Fisher in British Columbia. Wildlife Bulletin B-105. B.C. Ministry of Water, Land and Air Protection, Victoria, British Columbia.

Weir, R. D. 2007. Fisher ecology in the Kiskatinaw Plateau ecosection: Inventory and research: year-end report. B.C. Ministry of Environment.

Weir, R. D. and A. S. Harestad. 2003. Scale-dependent Habitat Selectivity by Fishers in South-Central British Columbia. Journal of Wildlife Management 67:73–82.

Weir, R. D., A. S. Harestad, and R. C. Wright. 2005. Winter diet of fishers in British Columbia. Northwestern Naturalist 86:12-19.

Wengert, G.M. 2013. Ecology of Intraguild Predation on Fishers (*Martes pennanti)* in California. PhD. dissertation, Univ. of California, Davis.

Wiles, G. J., H. L. Allen, and G. E. Hayes. 2011. Wolf conservation and management plan for Washington. Washington Department of Fish and Wildlife, Olympia, WA. 297 p.

Wright, P. L. and M. W. Coulter. 1967. Reproduction and growth in Maine fishers. J. Wildlife Management 31:70-87.
York, E. C. 1996. Fisher population dynamics in north-central Massachusetts. Thesis, University of Massachusetts, Amherst.
Zielinski, W. J., N. P. Duncan, E. C. Farmer, R. L. Truex, A. P. Clevenger, and R. H. Barrett. 1999. Diet of fishers (Martes pennanti) at the southernmost extent of their range. Journal of Mammalogy 80:961–71.
Zielinski, W. J., R. L. Truex, G. A. Schmidt, F. V Schlexer, K. N. Schmidt, and R. H. Barrett. 2004. Resting habitat selection by fishers in California. Journal of Wildlife Management 68:475-492.
Zielinski, W. J., R. L. Truex, J. R. Dunk, and T. Gaman. 2006. Using forest inventory data to assess fisher resting habitat suitability in California. Ecological Applications 16:1010-1025.

# Appendix B: Minimum Requirement Decision Guide

**ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER**

# MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

*"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"*

-- The Wilderness Act of 1964

| **Project Title:** | **Mount Rainier National Park and North Cascades National Park Service Complex Fisher Restoration Plan / Environmental Assessment** |
|---|---|

## MRDG STEP 1

*Determine if Administrative Action is Necessary*

## Description of the Situation

*What is the situation that may prompt administrative action?*

In accordance with the Wilderness Act of 1964, the Washington Parks Wilderness Act (1988) designated as wilderness approximately 216,855 acres (97 percent) of Mount Rainier National Park (MORA) as the Mount Rainier Wilderness and approximately 634,614 acres (94 percent) of North Cascades National Park Service Complex (NOCA) as the Stephen Mather Wilderness.

Since the designation of these wildernesses, the Washington Department of Fish and Wildlife (WDFW) has determined that the fisher (*Pekania pennanti*), a medium-sized carnivore in the weasel family, has been extirpated from its historic range throughout the State, including the Mount Rainier and Stephen Mather Wildernesses, due to the combined effects of over-trapping and habitat loss and fragmentation in low to mid-elevation coniferous forests (Aubry and Houston 1992, Lewis and Stinson 1998). This determination has been further confirmed by extensive surveys completed by WDFW, the National Park Service (NPS), and the U.S. Forest Service (USFS) (Lewis and Stinson 1998, Aubry and Lewis 2003, Hayes and Lewis 2006, Christophersen et al. 2005, Christophersen 2006, Reid et al. 2010). In light of this extirpation, the Washington Fish and Wildlife Commission listed the fisher as endangered in 1998, and due to the depleted status of the fisher throughout portions of its former range, including Washington, the U.S. Fish and Wildlife Service listed the West Coast Distinct Population Segment of the fisher as a federal candidate species in 2004 (USFWS 2004b).

In an effort to restore the fisher to its historic range in Washington State, WDFW is proposing to

reintroduce fishers to the SW and NW Cascades, including MORA and the Mount Rainier Wilderness and NOCA and the Stephen Mather Wilderness, and monitor individual fishers once reintroduced. While WDFW and the NPS are not considering reintroducing fishers directly in wilderness, it is assumed that fishers would travel to and through and establish home ranges within these wildernesses, thereby impacting wilderness character. Furthermore, because fishers would be present in wilderness, WDFW and the NPS are proposing to complete monitoring within both wildernesses in order to gather ample information to inform reintroductions in the following years of this proposed project (implement adaptive management) and evaluate success of the reintroductions in the SW and NW Cascades (see "Objectives" in chapter 1 of the Plan/EA).

Please see chapter 1 of the Plan/EA for more background on the fisher, its extirpation in the SW and NW Cascades, and plans to restore this species to its historic range.

## Options Outside of Wilderness

*Can action be taken outside of wilderness that adequately addresses the situation?*

| | |
|---|---|
| ☐ YES | **STOP – DO NOT TAKE ACTION IN WILDERNESS** |
| ☒ NO | **EXPLAIN AND COMPLETE STEP 1 OF THE MRDG** |

Explain:

WDFW and the NPS are not proposing to reintroduce fishers directly in wilderness. However, it is assumed that fishers would travel to and through and establish home ranges in the Mount Rainier and Stephen Mather Wildernesses, and if present in either or both wildernesses, monitoring fishers within that wilderness would be necessary. As identified in chapter 1 of this Plan/EA, some of the primary objectives of this proposed action are to: 1) restore self-sustaining fisher populations that are capable of surviving and reproducing by natural means 2) protect and perpetuate the natural distribution and abundance of fishers throughout suitable habitat in MORA and NOCA, and 3) expand scientific understanding regarding habitat use, movement, reproduction and survival, and use such information to adaptively manage fisher restoration in the SW and NW Cascades. All of these objectives require monitoring to detect fishers in the parks/wildernesses, estimate the survival rate of reintroduced fishers, and determine the number of reproducing females and the number of fisher that establish home ranges. This monitoring cannot occur outside wilderness if fishers are located within the wilderness.

## Criteria for Determining Necessity

*Is action necessary to meet any of the criteria below?*

### A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that requires action? Cite law and section.*

☐ YES ☒ NO

**Explain:** This proposed action does not entail mineral access, water rights, rights-of-ways, or access to inholdings.

### B. Requirements of Other Legislation

*Is action necessary to meet the requirements of other federal laws? Cite law and section.*

☒ YES ☐ NO

**Explain:** The Endangered Species Act of 1973 requires all federal agencies to use their authorities in furtherance of the purposes of the Endangered Species Act by carrying out programs for the conservation of endangered and threatened species (Section 7(a)).

### C. Wilderness Character

*Is action necessary to preserve one or more of the qualities of wilderness character, including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Other Features of Value?*

#### *Untrammeled*

☐ YES ☒ NO

**Explain:** The wilderness character of the Mount Rainier and Stephen Mather Wildernesses are already "trammeled" due to the extirpation of the fisher; taking no action would have no additional impact to the "untrammeled" quality of wilderness character of either Wilderness.

#### *Undeveloped*

☐ YES ☒ NO

**Explain:** This proposal would not preserve the undeveloped quality of wilderness character in either the Mount Rainier or Stephen Mather Wilderness.

#### *Natural*

☒ YES ☐ NO

**Explain:** The fisher, native to the SW and NW Cascades (including MORA and NOCA), has been extirpated from the region since at least the early 1990s and is currently a stated-listed endangered species and federally-listed candidate species (federal listing is for the West Coast Distinct Population Segment [DPS] of the fisher). This extirpation not only threatens the overall strength and resiliency of the species, but it also has had a negative impact on the SW and NW Cascades ecosystems and the natural quality of the wilderness character of the Mount Rainier and Stephen Mather Wildernesses. This action would restore a significant aspect of the natural processes of ecological systems within the Mount Rainier and Stephen Mather Wildernesses to a state in which they are substantially free from the effects of modern civilization. This restoration is necessary to administer the area as wilderness.

#### *Solitude or Primitive & Unconfined Recreation*

☐ YES ☒ NO

**Explain:** Restoration of fisher is not necessary to preserve opportunities for solitude or primitive and unconfined recreation in either the Mount Rainier or Stephen Mather Wilderness.

#### *Other Features of Value*

☐ YES ☒ NO

**Explain:** Although this proposal would increase scientific understanding of the fisher and species reintroductions and would enhance educational opportunities for the public, this proposal is not *necessary* to preserve these or other features of value in either the Mount Rainier or Stephen Mather Wilderness.

## Step 1 Decision

*Is administrative action necessary in wilderness?*

### Decision Criteria

| | | | |
|---|---|---|---|
| A. | Existing Rights or Special Provisions | ☐ YES | ☒ NO |
| B. | Requirements of Other Legislation | ☒ YES | ☐ NO |
| C. | Wilderness Character | | |
| | Untrammeled | ☐ YES | ☒ NO |
| | Undeveloped | ☐ YES | ☒ NO |
| | Natural | ☒ YES | ☐ NO |
| | Outstanding Opportunities | ☐ YES | ☒ NO |
| | Other Features of Value | ☐ YES | ☒ NO |

### Is administrative action necessary in wilderness?

| | |
|---|---|
| ☒ YES | **EXPLAIN AND PROCEED TO STEP 2 OF THE MRDG** |
| ☐ NO | **STOP – DO NOT TAKE ACTION IN WILDERNESS** |

Explain:

The fisher, native to the SW and NW Cascades (including MORA and NOCA), has been extirpated from the region since at least the early 1990s and is currently a stated-listed endangered species and federally-listed candidate species (federal listing is for the West Coast Distinct Population Segment of the fisher). This extirpation threatens the overall strength and resiliency of the species and has had a negative impact on the SW and NW Cascades ecosystems, including the natural quality of wilderness character in both the Mount Rainier and Stephen Mather Wildernesses. Furthermore, successful reintroduction would not be feasible without monitoring to ensure that management actions are proceeding in such a way as to support the reproduction and establishment of fishers into the future and if not, to modify reintroduction efforts as needed. Because the restoration of fishers is necessary to restore this important aspect of the natural quality of these wilderness, actions to reintroduce (including monitoring) the fisher to the Mount Rainier and Stephen Mather Wildernesses are necessary to administer these areas as wilderness.

Application of the Wilderness Act and Endangered Species Act indicate that an action is needed to restore fisher to the Mount Rainer and Stephen Mather Wildernesses.

## MRDG STEP 2

*Determine the Minimum Activity*

## Other Direction

*Is there "special provisions" language in legislation (or other Congressional direction) that explicitly* ***allows*** *consideration of a use otherwise prohibited by Section 4(c)?* ***AND/OR*** *Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?*

| | |
|---|---|
| ☒ YES | **DESCRIBE DOCUMENTS & DIRECTION BELOW** |
| ☐ NO | **SKIP AHEAD TO COMPONENTS OF THE ACTION BELOW** |

Describe Documents & Direction:

NPS *Management Policies 2006* direct the NPS to take action to restore native plant and animal populations that "have been extirpated by past human caused actions", whenever all of the following criteria are met:

- "Adequate habitat to support the species either exists or can reasonably be restored in the park, and if necessary also on adjacent public lands and waters; once a natural population level is achieved, the population can be self-perpetuating";
- "The species does not, based on an effective management plan, pose a serious threat to the safety of people in parks, park resources, or persons or property within or outside park boundaries";
- "The genetic type used in restoration most nearly approximates the extirpated genetic type";
- "The species disappeared, or was substantially diminished, as a direct or indirect result of human induced change to the species population or to the ecosystem"; and
- "Potential impacts upon park management and use have been carefully considered" (NPS 2006b,sec. 4.4.2.2).

When restoring these species, NPS *Management Policies 2006* further provide "The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function" (NPS 2006b, Section 4.1.5).

The Wilderness Management Plan (1989) for the Stephen Mather Wilderness establishes standards for minimal tool, stating, "Non-power tools will be preferred. The Wilderness District Ranger will have final approval for the use of power tools...Any use of power tools will be limited as far as possible to before the 4th of July and after Labor Day. All power tools will use a modified muffler that reduces decibel level...Power tools will be limited to chain saws, brushers, rock drills, chain saw winches, and explosives...Aircraft may only be used if stock use is not permitted on trails, trail conditions prevent stock use, or it is impractical to use stock and there is no other practical way to accomplish the work. Aircraft use will be confined to Monday through Thursday and as much as possible to before the 4th of July and after Memorial Day."

The Wilderness Management Plan (1989) for the Mount Rainier Wilderness establishes standards for minimal tool as well, such as, "Fixed wing aircraft are used in compliance with FAA regulations for administrative purposes such as for resource management, search and rescue and fire management operations."

The *Washington State Recovery Plan* for the fisher concludes that reintroduction is the best way to

restore fishers in the SW and NW Cascades recovery areas. Based on this plan, WDFW wrote an *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* that outlines steps to reintroduce fisher to these two recovery areas (which includes MORA and NOCA) and monitor fishers for at least three years following reintroduction.

## Components of the Action

*What are the discrete components or phases of the action?*

| | |
|---|---|
| Component 1: | Transport and release fishers outside of wilderness |
| Component 2: | Tracking device placed on released fishers (founding population only) |
| Component 3: | Transportation of personnel to track founding population |
| Component 4: | Transportation of personnel and tools to install temporary monitoring stations |
| Component 5: | Temporary monitoring stations |
| Component 6: | Condition of site after project |
| Component 7: | Scientific understanding and educational opportunities |

## Alternative 1

### VHF Collars and Aerial Telemetry; Hair-Snares and Remote Camera Stations Installed by Foot

#### Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

In this alternative, all fishers reintroduced to the SW and NW Cascades would be equipped with a **VHF radio-transmitter collar** and marked with a passive integrated transponder (PIT) tag prior to their release. Aerial telemetry, based on VHF radio transmitters, with **fixed wing-aircraft** would then be used to monitor fishers during the reintroduction. For a maximum of two years following each release (years 1-3 for each reintroduction), **flights would occur weekly**, weather permitting, in areas where fishers are expected to occur (i.e. above suitable fisher habitat) (see Figures 2.1 and 2.2 in Fisher Plan/EA). When fisher are not detected, flights would be as high as possible (while still close enough to obtain a signal), but aircraft would fly as low as 333 feet above the canopy or 500 feet above ground limit (whichever is higher) when fishers are detected in order to tract the signal. Whenever possible (weather permitting), flights would occur between Monday and Thursday. The number of locations obtained for each fisher would be limited by 1) the lifespan of radio-transmitters, 2) suitable weather conditions for flying, and 3) available funding for telemetry flights. Given potential limitations on data collection, the objective would be to get at least one location per week for individual fishers, with a maximum of five flights per month. Where access allows, telemetry would be completed by foot and mortalities and suspected den sites would be investigated on foot to collect the carcass or verify denning and reproduction. VHF collars are expected to last two years. Flights would occur only so long as resource staff obtain signals from the VHF transmitters. All cast collars and collars from mortalities would be retrieved via foot access where reasonable access allows.

During fisher release years and one year post-release, **temporary remote camera stations** would be placed in the backcountry **via foot** to detect repeated female visitation at suspected den sites and the presence of kits. These stations would be placed in areas with little visitor use and would be out-of-site for visitors.

Because of these extensive monitoring procedures, WDFW and NPS staff would likely have ample information to adaptively manage fisher reintroductions and respond to any issues that arise in reintroduction efforts in order to **ensure greater success** with the project (i.e. meet the objectives of the proposed action). These monitoring procedures would allow staff to estimate survival rate, the number of fisher that establish a home range, and the number of reproducing females in order to determine if the restored fisher populations are capable of surviving and reproducing by natural means (first objective). They would also be able to detect fishers in MORA and NOCA in order to determine if fishers are distributed and abundant in these parks (third objective), and this monitoring would **expand scientific understanding** regarding fisher habitat use, movement, reproduction and survival (fourth objective).

### Component Activities

*How will each of the components of the action be performed under this alternative?*

| Component of the Action | | Activity for this Alternative |
|---|---|---|
| 1 | Release fishers outside of wilderness | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) |
| 2 | Tracking device placed on released fishers (founding population only) | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades |
| 3 | Transportation of personnel to track founding population | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected |
| 4 | Transportation of personnel and tools to install temporary monitoring stations | Personnel and tools would be transported by foot |
| 5 | Temporary monitoring stations | Remote camera stations would be installed at areas of suspected denning activity |
| 6 | Condition of site after project | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) |
| 7 | Scientific understanding and educational opportunities | Scientific understanding would be improved. Educational opportunities would be enhanced. |

### Measuring Impacts

Because this proposal includes two reintroductions in two wildernesses: the Mount Rainier Wilderness in MORA and the Stephen Mather Wilderness in NOCA, impacts were analyzed for these wildernesses separately (see tables below).

#### *Wilderness Character*

*What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?*

**Untrammeled**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | objectives are met (see chapter 1 of Plan/EA) | | | | | | |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 2 | NE | |
| **Untrammeled Total Rating** | | **-4** | | | | | |

Explain:

By reintroducing fisher in the SW and NW Cascades, when they have been extirpated by human actions, the NPS would be actively managing the wilderness through which and in which these animals are expected to travel and establish homeranges. This activity, along with the placement of tracking collars on fishers in wilderness, negatively impacts the untrammeled quality of wilderness character.

**Undeveloped**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 3 | 3 | NE | |
| **Undeveloped Total Rating** | | **-6** | | | | | |

Explain:

VHF radio-transmitter collars (160 total collars), fixed wing flights (During the OLYM fisher reintroduction, approximately 192.9 to 254.4 hours of fixed-wing flights occurred annually over the park and surrounding lands in association with fisher monitoring efforts – less than half of these hours were over the park), and placing temporary installations in the wilderness would have a short-term negative impact on the undeveloped quality of wilderness character.

**Natural**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 2 | 2 | 0 | 0 | NE | |
| **Natural Total Rating** | | 4 | | | | | |

Explain:

In ensuring successful restoration of an extirpated, state-listed endangered mesocarnivore through reintroductions, monitoring, and adaptively management, this action would have a moderate, long-term, beneficial impact on the naturalness of the Mount Rainier and Stephen Mather Wildernesses because it would improve the processes and biodiversity of these wilderness ecosystems by completing the native predator guild within these wildernesses, which would have positive cascading effects on other species present.

**Solitude or Primitive & Unconfined Recreation**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Total Number of Effects | | 3 | 3 | 4 | 4 | NE | |
| **Solitude or Primitive and Unconfined Recreation Total Rating** | | **-2** | | | | | |

Explain:

Actual release activities have the potential to impact winter visitors to the wilderness as sounds from transportation to release sites and actions associated with releases may travel into the wilderness. However, as visitation is low in both wildernesses during the winter when releases are scheduled to occur (particularly in NOCA), it is more likely that visitors who have the opportunity to participate in a release would benefit to a greater extent and more substantially than those who may be impacted by transient noises associated with release activities (component 1). Similarly, knowing fishers have been restored to the wilderness, having the slim, though real, chance to see a fisher in the wild and in its native habitat, and having enhanced opportunities to learn about fisher reintroduction would have a long-term beneficial impact on opportunities for primitive and unconfined recreation for both visitors to the wilderness and non-visitors alike (components 6 and 7). While the increased likelihood of seeing a fisher in the wild would be a long-term beneficial impact to the wilderness character of both the Mount Rainier and Stephen Mather Wildernesses, if a visitor happened to see a fisher collared (only the founding population), it would diminish this beneficial impact. Because fishers have large home ranges and tend to be dispersed throughout remote areas, the chances of seeing a fisher in the backcountry, particularly along traveled trails and in campgrounds, would likely be extremely low.

Seeing NPS personnel in the backcountry, finding a remote camera station (through rare, this has happened), and seeing/hearing fixed-wing aircraft associated monitoring would have a short-term negative impact on visitors' opportunities for solitude in the wilderness.

**Other Features of Value**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |

| | | | | | |
|---|---|---|---|---|---|
| Total Number of Effects | 1 | 1 | 0 | 0 | NE |
| **Other Features of Value Total Rating** | **2** | | | | |

Explain:

The monitoring activities that would accompany reintroduction would inform future reintroduction efforts of native species – a long-term benefit to scientific understanding of these processes. This information could also be used to enhance education and outreach in and around both wildernesses, a beneficial impact.

***Other Criteria***

*What is the effect of each component activity on other comparison criteria? What mitigation measures will be taken?*

**Maintaining Traditional Skills**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | NE | |
| **Maintaining Traditional Skills Total Rating** | | **0** | | | | | |

Explain:

No action in this alternative helps to maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

**Special Provisions**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | NE | |
| **Special Provisions Total Rating** | | **0** | | | | | |

Explain:

No special provisions are impacted by this alternative.

**Economics & Time Constraints**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| Total Number of Effects | | 1 | 1 | 6 | 6 | NE | |
| **Economics & Time Constraints Total Rating** | | **-10** | | | | | |

Explain:

****Impacts under economic and time constraints are in comparison to other alternatives.**** Reintroducing a total of 160 fishers to the SW and NW Cascades would represent a large portion of the funding for this project and is time-sensitive (ideally fisher would be released in the late fall, early winter to give females time to establish dens). As this is twice the cost and work load of

Alternative 4, this is evaluated as a negative impact on economics and time constraints. Similarly, this alternative would involve the installation of more camera stations (and associated staff time) than Alternative 4; hence the evaluation of a negative impact for these project components.

While VHF radio-transmitter collars cost less than satellite collars (Alternative 3)($200 vs. $2000 for satellite collars), they could compromise monitoring as they are more likely to fall off than implanted VHF radio-transmitters (Alternative 2) and don't provide the same amount of data as satellite collars (Alternative 3); hence the evaluation of a negative impact for this project component.

Weekly aerial telemetry flights (associated with VHF radio-transmitters), while providing ample monitoring results, would also cost more than using satellite collars (Alternative 3) which require less flights; hence the evaluation of a negative impact for this project component.

In meeting the objectives of restoration in *both* the SW and NW Cascades (associated with component 6), this alternative would ensure greatest efficiency of fisher restoration in that one reintroduction would immediately follow the other reintroduction – taking advantage of the infrastructure and staff knowledge created and developed within the first reintroduction. This alternative would also double the amount of scientific information on reintroductions (in comparison to Alternative 4) which would improve the efficiency of future reintroduction efforts elsewhere. However, less information would be gathered than that available when using satellite collars; hence an evaluation of a negative impact.

### *Safety of Visitors & Workers*

*What is the effect of each component activity on the safety of visitors and workers? What mitigation measures will be taken?*

**Safety of Visitors & Workers**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF (radio-transmitter) collar would be placed on all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 2 | NE | |
| **Safety of Visitors & Workers Total Rating** | | -4 | | | | | |

Explain:

Fixed wing aircraft flights are a high risk activity and pose a threat to staff safety. Similarly, given the terrain of both wildernesses and the remote locations that fishers are expected to inhabit, traveling by foot to den-sites, etc. is also a risky activity that demands that considerations for human health and safety be made during trip planning.

### Summary Ratings for Alternative 1

| Wilderness Character | |
|---|---|
| Untrammeled | -4 |
| Undeveloped | -6 |
| Natural | 4 |
| Solitude or Primitive & Unconfined Recreation | -2 |
| Other Features of Value | 2 |
| **Wilderness Character Summary Rating** | **-6** |

| Other Criteria | |
|---|---|
| Maintaining Traditional Skills | 0 |
| Special Provisions | 0 |
| Economics & Time Constraints | -10 |
| **Other Criteria Summary Rating** | **-10** |

| Safety | |
|---|---|
| Safety of Visitors & Workers | -4 |
| **Safety Summary Rating** | **-4** |

## Alternative 2

### Implanted VHF Transmitters & Aerial Telemetry; Hair-Snares & Remote Camera Stations Installed by Foot

#### Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

In this alternative, all fishers reintroduced to the SW and NW Cascades would be equipped with a **surgically-implanted VHF radio-transmitter** and marked with a passive integrated transponder (PIT) tag prior to their release. Aerial telemetry, based on VHF radio transmitters, with **fixed wing-aircraft** would then be used to monitor fishers during the reintroduction. For a maximum of two years following each release (years 1-3 for each reintroduction), **flights would occur weekly**, weather permitting, in areas where fisher are expected to occur (i.e. above suitable fisher habitat) (see Figures 2.1 and 2.2 in Fisher Plan/EA). When fisher are not detected, flights would be as high as possible (while still close enough to obtain a signal), but aircraft would fly as low as 333 feet above the canopy or 500 feet above ground limit (whichever is higher) when fishers are detected in order to tract the signal. Whenever possible (weather permitting), flights would occur between Monday and Thursday. The number of locations obtained for each fisher would be limited by 1) the lifespan of radio-transmitters, 2) suitable weather conditions for flying, and 3) available funding for telemetry flights. Given potential limitations on data collection, the objective would be to get at least one location per week for individual fishers, with a maximum of five flights per month. Where access allows, telemetry would be completed by foot and mortalities and suspected den sites would be investigated on foot to collect the carcass or verify denning and reproduction. VHF implants are expected to last two years, maximum, but would remain implanted in the fisher throughout its life. These transmitters would likely never be located once the fisher dies. Flights would occur only so long as resource staff obtain signals from the VHF transmitters.

During fisher release years and one year post-release, **temporary remote camera stations** would be placed in the backcountry **via foot** to detect repeated female visitation at suspected den sites and the presence of kits. These stations would be placed in areas with little visitor use and would be out-of-site for visitors.

Because of these extensive monitoring procedures, WDFW and NPS staff should have ample information to adaptively manage fisher reintroductions and respond to any issues that arise in reintroduction efforts in order to **ensure greater success with the project** (i.e. meet the objectives of the proposed action). These monitoring procedures would allow staff to estimate survival rate, the number of fisher that establish a home range, and the number of reproducing females in order to determine if the restored fisher populations are capable of surviving and reproducing by natural means (first objective). They would also be able to detect fishers in MORA and NOCA in order to determine if fishers are distributed and abundant in these parks (third objective), and this monitoring would **expand scientific understanding** regarding fisher habitat use, movement, reproduction and survival (fourth objective).

### Component Activities

*How will each of the components of the action be performed under this alternative?*

| Component of the Action | | Activity for this Alternative |
|---|---|---|
| 1 | Release fishers outside of wilderness | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) |
| 2 | Tracking device placed on released fishers (founding population only) | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades |
| 3 | Transportation of personnel to track founding population | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected |
| 4 | Transportation of personnel and tools to install temporary monitoring stations | Personnel and tools would be transported by foot |
| 5 | Temporary monitoring stations | Remote camera stations would be installed at areas of suspected denning activity |
| 6 | Condition of site after project | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) |
| 7 | Scientific understanding and enhanced educational opportunities | Scientific understanding would be improved. Educational opportunities would be enhanced. |

### Measuring Impacts

Because this proposal includes two reintroductions in two wildernesses: the Mount Rainier Wilderness in MORA and the Stephen Mather Wilderness in NOCA, impacts were analyzed for these wildernesses separately (see tables below).

#### *Wilderness Character*

*What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?*

**Untrammeled**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | objectives are met (see chapter 1 of Plan/EA) | | | | | | |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 2 | NE | |
| **Untrammeled Total Rating** | | -4 | | | | | |

Explain:

By reintroducing fisher in the SW and NW Cascades, when they have been extirpated by human actions, the NPS would be actively managing the wilderness through which and in which these animals are expected to travel and establish homeranges. This activity, along with implanting tracking devices in fishers in wilderness, negatively impacts the untrammeled quality of wilderness character.

**Undeveloped**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 2 | NE | |
| **Undeveloped Total Rating** | | -4 | | | | | |

Explain:

Fixed wing flights and placing temporary installations in the wilderness would have a short-term negative impact on the undeveloped quality of wilderness character.

**Natural**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 2 | 2 | 0 | 0 | NE | |
| **Natural Total Rating** | | 4 | | | | | |

Explain:

In ensuring successful restoration of an extirpated, state-listed endangered mesocarnivore through reintroductions, monitoring, and adaptively management, this action would have a moderate, long-term, beneficial impact on the naturalness of the Mount Rainier and Stephen Mather Wildernesses because it would improve the processes and biodiversity of these wilderness ecosystems by completing the native predator guild within these wildernesses which would have positive cascading effects on other species present.

**Solitude or Primitive & Unconfined Recreation**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Total Number of Effects | | 3 | 3 | 3 | 3 | NE | |
| **Solitude or Primitive and Unconfined Recreation Total Rating** | | **0** | | | | | |

Explain:

Actual release activities have the potential to impact winter visitors to the wilderness as sounds from transportation to release sites and actions associated with releases may travel into the wilderness. However, as visitation is low in both wildernesses during the winter when releases are scheduled to occur (particularly in NOCA), it is more likely that visitors who have the opportunity to participate in a release would benefit to a greater extent and more substantially than those who may be impacted by transient noises associated with release activities (component 1). Similarly, knowing fishers have been restored to the wilderness, having the slim, though real, chance to see a fisher in the wild and in its native habitat, and having enhanced opportunities to learn about fisher reintroduction would have a long-term beneficial impact on opportunities for primitive and unconfined recreation for both visitors to the wilderness and non-visitors alike (components 6 and 7). Because fishers have large homeranges and tend to be dispersed throughout remote areas, the chances of seeing a fisher in the backcountry, particularly along traveled trails and in campgrounds, would likely be extremely low.

Seeing NPS personnel in the backcountry, finding a remote camera station (through rare, this has happened), and seeing/hearing fixed-wing aircraft associated monitoring would have a short-term negative impact on visitors' opportunities for solitude in the wilderness.

**Other Features of Value**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Total Number of Effects | | 1 | 1 | 0 | 0 | NE | |
| **Other Features of Value Total Rating** | | **2** | | | | | |

Explain:

The monitoring activities that would accompany reintroduction would inform future reintroduction efforts of native species – a long-term benefit to scientific understanding of these processes. This information could also be used to enhance education and outreach in and around both wildernesses, a beneficial impact.

### *Other Criteria*

*What is the effect of each component activity on other comparison criteria? What mitigation measures will be taken?*

**Maintaining Traditional Skills**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | NE | |
| **Maintaining Traditional Skills Total Rating** | | **0** | | | | | |

Explain:

No action in this alternative helps to maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

**Special Provisions**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | NE | |
| **Special Provisions Total Rating** | | **0** | | | | | |

Explain:

No special provisions are impacted by this alternative.

**Economics & Time Constraints**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| Total Number of Effects | | 2 | 2 | 5 | 5 | NE | |
| **Economics & Time Constraints Total Rating** | | **-6** | | | | | |

Explain:

****Impacts under economic and time constraints are in comparison to other alternatives.****

Reintroducing a total of 160 fishers to the SW and NW Cascades would represent a large portion of the funding for this project and is time-sensitive (ideally fisher would be released in the late fall, early winter to give females time to establish dens). As this is twice the cost and work load of Alternative 4, this is evaluated as a negative impact on economics and time constraints. Similarly, this alternative would involve the installation of more camera stations (and associated staff time) than Alternative 4; hence the evaluation of a negative impact for these project components.

Implanted VHF radio-transmitters cost less than satellite collars (Alternative 3) ($200 in

comparison to $2000) and are more durable than either collar option considered in Alternatives 1 and 3; hence the evaluation of a positive impact.

Weekly aerial telemetry flights (associated with VHF radio-transmitters), while providing ample monitoring results, would also cost more than using satellite collars (Alternative 3) which require less flights; hence the evaluation of a negative effect.

In meeting the objectives of restoration in *both* the SW and NW Cascades (associated with component 6), this alternative would ensure greatest efficiency of fisher restoration in that one reintroduction would immediately follow the other reintroduction – taking advantage of the infrastructure and staff knowledge created and developed within the first reintroduction. This alternative would also double the amount of scientific information on reintroductions (in comparison to Alternative 4) which would improve the efficiency of future reintroduction efforts elsewhere. However, less information would be gathered than that available when using satellite collars; hence an evaluation of a negative impact.

### *Safety of Visitors & Workers*

*What is the effect of each component activity on the safety of visitors and workers? What mitigation measures will be taken?*

**Safety of Visitors & Workers**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | A VHF radio-transmitter would be implanted in all fishers reintroduced in the Cascades | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 2 | NE | |
| **Safety of Visitors & Workers Total Rating** | | -4 | | | | | |

Explain:

Fixed wing aircraft flights are a high risk activity and pose a threat to staff safety. Similarly, given the terrain of both wildernesses and the remote locations that fishers are expected to inhabit, traveling by foot to den-sites, etc. is also a risky activity that demands that considerations for human health and safety be made during trip planning.

**Summary Ratings for Alternative 2**

| Wilderness Character | |
|---|---|
| Untrammeled | -4 |
| Undeveloped | -4 |
| Natural | 4 |
| Solitude or Primitive & Unconfined Recreation | 0 |
| Other Features of Value | 2 |
| **Wilderness Character Summary Rating** | **-2** |

| Other Criteria | |
|---|---|
| Maintaining Traditional Skills | 0 |
| Special Provisions | 0 |
| Economics & Time Constraints | -6 |
| **Other Criteria Summary Rating** | **-6** |

| Safety | |
|---|---|
| Safety of Visitors & Workers | -4 |
| **Safety Summary Rating** | **-4** |

## Alternative 3

**Satillite Collars Tested; Hair-Snares & Remote Camera Stations Installed by Foot**

### Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

In this alternative, most fishers reintroduced to the SW and NW Cascades would be equipped with a **surgically-implanted VHF radio-transmitter** and marked with a passive integrated transponder (PIT) tag prior to their release. However, **satellite collars** (which do not require as many flights as radio-telemetry) would also be used on a trial basis, starting with a few males in the first year of reintroductions, and increasingly used if found to be effective (little impact to fisher, light enough for females to carry, good data collection, few instances of collars falling off animals, extended life of collar, etc.). Aerial telemetry with **fixed wing-aircraft** would be used to monitor fishers with VHF transmitters, and satellite data would be collected off site for those fishers with satellite collars. For a maximum of two years following each release (years 1-3 for each reintroduction), flights would occur weekly (maximum of five flights per month), weather permitting, in areas where fishers are expected to occur (i.e. above suitable fisher habitat in areas where fishers with VHF transmitters are released) (see Figures 2.1 and 2.2 in Fisher Plan/EA). When fisher are not detected, flights would be as high as possible (while still close enough to obtain a signal), but aircraft would fly as low as 333 feet above the canopy or 500 feet above ground limit (whichever is higher) when fishers are detected in order to tract the signal. Whenever possible (weather permitting), flights would occur between Monday and Thursday, with a maximum of five flights per month. Where access allows, telemetry would be completed by foot and mortalities and suspected den sites would be investigated on foot to collect the carcass or verify denning and reproduction. VHF implants are expected to last two years, maximum, but would remain implanted in the fisher throughout its life (these transmitters would likely never be located once the fisher dies). Flights would occur only so long as resource staff obtain signals from the VHF transmitters. Satellite collars are expected to last two years. All cast collars and collars from mortalities would be retrieved via foot access where reasonable access allows.

During fisher release years and one year post-release, **temporary remote camera stations** would be placed in the backcountry **via foot** to detect repeated female visitation at suspected den sites and the presence of kits. These stations would be placed in areas with little visitor use and would be out-of-site for visitors.

Because of these extensive monitoring procedures, WDFW and NPS staff should have ample information to adaptively manage fisher reintroductions and respond to any issues that arise in reintroduction efforts in order to **ensure greater success with the project** (i.e. meet the objectives of the proposed action). These monitoring procedures would allow staff to estimate survival rate, the number of fisher that establish a home range, and the number of reproducing females in order to determine if the restored fisher populations are capable of surviving and reproducing by natural means (first objective). They would also be able to detect fishers in MORA and NOCA in order to determine if fishers are distributed and abundant in these parks (third objective), and this monitoring would **expand scientific understanding** regarding fisher habitat use, movement, reproduction and survival (fourth objective).

### Component Activities

*How will each of the components of the action be performed under this alternative?*

| Component of the Action | | Activity for this Alternative |
|---|---|---|
| 1 | Release fishers outside of wilderness | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) |
| 2 | Tracking device placed on released fishers (founding population only) | VHF radio-transmitters would be implanted in fishers; satillite collars would be tested |
| 3 | Transportation of personnel to track founding population | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected |
| 4 | Transportation of personnel and tools to install temporary monitoring stations | Personnel and tools would be transported by foot |
| 5 | Temporary monitoring stations | Remote camera stations would be installed at areas of suspected denning activity |
| 6 | Condition of site after project | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) |
| 7 | Scientific understanding and enhanced educational opportunities | Scientific understanding would be improved. Educational opportunities would be enhanced. |

### Measuring Impacts

Because this proposal includes two reintroductions in two wildernesses: the Mount Rainier Wilderness in MORA and the Stephen Mather Wilderness in NOCA, impacts were analyzed for these wildernesses separately (see tables below).

#### *Wilderness Character*

*What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?*

**Untrammeled**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | objectives are met (see chapter 1 of Plan/EA) | | | | | | |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 2 | NE | |
| **Untrammeled Total Rating** | | **-4** | | | | | |

Explain:

By reintroducing fisher in the SW and NW Cascades, when they have been extirpated by human actions, the NPS would be actively managing the wilderness through which and in which these animals are expected to travel and establish homeranges. This activity, along with implanting tracking devices in or placing tracking collars on fishers in wilderness, negatively impacts the untrammeled quality of wilderness character.

**Undeveloped**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 3 | 3 | NE | |
| **Undeveloped Total Rating** | | **-6** | | | | | |

Explain:

Satellite collars (fewer collars used than Alternative 1; initially five and possibly more, maximum would be 125 collars though likely far less), fixed wing flights, and placing temporary installations in the wilderness would have a short-term negative impact on the undeveloped quality of wilderness character. This alternative would require slightly less flights than Alternatives 1 and 2 due to the use of satellite collars on some fishers, which require less flights.

**Natural**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 2 | 2 | 0 | 0 | NE | |
| **Natural Total Rating** | | 4 | | | | | |

Explain:

In ensuring successful restoration of an extirpated, state-listed endangered mesocarnivore through reintroductions, monitoring, and adaptively management, this action would have a moderate to major, long-term, beneficial impact on the naturalness of the Mount Rainier and Stephen Mather Wildernesses because it would improve the processes and biodiversity of these wilderness ecosystems by completing the native predator guild within these wildernesses which would have positive cascading effects on other species present.

**Solitude or Primitive & Unconfined Recreation**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Total Number of Effects | | 3 | 3 | 4 | 4 | NE | |
| **Solitude or Primitive and Unconfined Recreation Total Rating** | | **-2** | | | | | |

Explain:

Actual release activities have the potential to impact winter visitors to the wilderness as sounds from transportation to release sites and actions associated with releases may travel into the wilderness. However, as visitation is low in both wildernesses during the winter when releases are scheduled to occur (particularly in NOCA), it is more likely that visitors who have the opportunity to participate in a release would benefit to a greater extent and more substantially than those who may be impacted by transient noises associated with the releases (component 1). Similarly, knowing fishers have been restored to the wilderness, having the slim, though real, chance to see a fisher in the wild and in its native habitat, and having enhanced opportunities to learn about fisher reintroduction would have a long-term beneficial impact on opportunities for primitive and unconfined recreation for both visitors to the wilderness and non-visitors alike (components 6 and 7). While the increased likelihood of seeing a fisher in the wild would be a long-term beneficial impact to the wilderness character of both the Mount Rainier and Stephen Mather Wildernesses, if a visitor happened to see a fisher collared (only the founding population), it would diminish this beneficial impact (though far fewer collars used than Alternative 1). Because fishers have large homeranges and tend to be dispersed throughout remote areas, the chances of seeing a fisher in the backcountry, particularly along traveled trails and in campgrounds, would likely be extremely low.

Seeing NPS personnel in the backcountry, finding a remote camera station (through rare, this has happened), and seeing/hearing fixed-wing aircraft associated monitoring would have a short-term negative impact on visitors' opportunities for solitude in the wilderness. This alternative would require slightly less flights than Alternatives 1 and 2 due to the use of satellite collars on some fishers.

**Other Features of Value**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☒ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | opportunities would be enhanced. | | | | | |
| Total Number of Effects | | 1 | 1 | 0 | 0 | NE |
| **Other Features of Value Total Rating** | | 2 | | | | |

Explain:

The monitoring activities that would accompany reintroduction would inform future reintroduction efforts of native species – a long-term benefit to scientific understanding of these processes. This information could also be used to enhance education and outreach in and around both wildernesses, a beneficial impact. The experimental use of emerging technology, such as satellite collars, would also enhance future restoration and species monitoring efforts and would provide even more data than obtained in Alternatives 1 and 2 due to the enhanced capabilities of satellite collars.

***Other Criteria***

*What is the effect of each component activity on other comparison criteria? What mitigation measures will be taken?*

**Maintaining Traditional Skills**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | NE | |
| **Maintaining Traditional Skills Total Rating** | | 0 | | | | | |

Explain:

No action in this alternative helps to maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

**Special Provisions**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | **NE** | |
| **Special Provisions Total Rating** | | **0** | | | | | |

Explain:

No special provisions are impacted by this alternative.

**Economics & Time Constraints**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☒ | ☒ | ☐ | ☐ | ☒ | ☒ |

| | | | | | |
|---|---|---|---|---|---|
| Total Number of Effects | 3 | 3 | 4 | 4 | NE |
| **Economics & Time Constraints Total Rating** | **-2** | | | | |

Explain:

****Impacts under economic and time constraints are in comparison to other alternatives.****

Reintroducing a total of 160 fishers to the SW and NW Cascades would represent a large portion of the funding for this project and is time-sensitive (ideally fisher would be released in the late fall, early winter to give females time to establish dens). As this is twice the cost and work load of Alternative 4, this is evaluated as a negative impact on economics and time constraints. Similarly, this alternative would involve the installation of more camera stations (and associated staff time) than Alternative 4; hence the evaluation of a negative impact for these project components.

Although satellite collars provide more data and require less flights than VHF radio-transmitters (Alternatives 1 and 2), they cost considerably more ($2,000 compared to $200 per device) and require additional administrative/logistical support because two devices and associated monitoring procedures would be used (added complexity) and the alternative would entail a pilot project that requires administrative oversight, an overall negative impact in comparison to other alternatives. However, aerial telemetry would be reduced under this alternative, in comparison to Alternatives 2 and 3; hence the evaluation of a positive impact.

In meeting the objectives of restoration in *both* the SW and NW Cascades (associated with component 6), this alternative would ensure greatest efficiency of fisher restoration in that one reintroduction would immediately follow the other reintroduction – taking advantage of the infrastructure and staff knowledge created and developed within the first reintroduction. This alternative would also double the amount of scientific information on reintroductions (in comparison to Alternative 4) and improve the quality of information gathered due to the use of satellite collars (in comparison to Alternatives 1 and 2); hence an evaluation of a positive impact.

### *Safety of Visitors & Workers*

*What is the effect of each component activity on the safety of visitors and workers? What mitigation measures will be taken?*

**Safety of Visitors & Workers**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | 80 fishers would be released outside of wilderness in both the SW and NW Cascades (160 total) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | NPS would have ample information to ensure all objectives are met (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be improved. Educational opportunities would be enhanced. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 2 | NE | |
| **Safety of Visitors & Workers Total Rating** | | -4 | | | | | |

Explain:

Fixed wing aircraft flights are a high risk activity and pose a threat to staff safety; however, this alternative may require slightly less flights than Alternatives 1 and 2 due to the use of satellite collars on some fishers. Given the terrain of both wildernesses and the remote locations that fishers are expected to inhabit, traveling by foot to den-sites, etc. is also a risky activity that demands that considerations for human health and safety be made during trip planning.

### Summary Ratings for Alternative 3

| **Wilderness Character** | |
|---|---|
| Untrammeled | -4 |
| Undeveloped | -6 |
| Natural | 4 |
| Solitude or Primitive & Unconfined Recreation | -2 |
| Other Features of Value | 2 |
| **Wilderness Character Summary Rating** | **-6** |

| **Other Criteria** | |
|---|---|
| Maintaining Traditional Skills | 0 |
| Special Provisions | 0 |
| Economics & Time Constraints | -2 |
| **Other Criteria Summary Rating** | **-2** |

| **Safety** | |
|---|---|
| Safety of Visitors & Workers | -4 |
| **Safety Summary Rating** | **-4** |

## Alternative 4

**No Action: No NPS Fisher Reintroductions in MORA and NOCA; Limited monitoring in MORA tied to WDFW actions**

### Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?*

Under this alternative, the NPS would not partner with WDFW to restore fishers into MORA or NOCA. No NPS funding would be allocated to fisher restoration, and **no fisher reintroductions would occur on NPS lands**.

However, the **State of Washington would proceed with fisher restoration in the SW Cascades**, outside of MORA, as outlined in WDFW's *Implementation Plan for Reintroducing Fishers to the Cascade Mountain Range in Washington* (available at wdfw.wa.gov/publications/01556/). It is assumed under this alternative that fishers would become distributed throughout the SW Cascades and may become established in MORA and the Mount Rainier Wilderness over time but would not be restored to the NW Cascades.

While it is unknown how soon fishers would immigrate to MORA and the Mount Rainier Wilderness, it is assumed that at least **some fishers equipped with tracking devices (mix of VHF radio-transmitters and satellite collars on founding population only) would still travel to and through and establish homeranges in the Mount Rainier Wilderness,** albeit delayed in comparison to Alternatives 1-3 as fishers would not be directly reintroduced into MORA. Therefore some **aerial telemetry with fixed wing-aircraft** would still be used by WDFW to monitor fishers during the reintroductions. Although limited due to less trackable fishers present in the Mount Rainier Wilderness, flights would occur weekly, weather permitting, in areas where fisher are expected to occur (i.e. above suitable fisher habitat) (see Figures 2.1 and 2.2 in Fisher Plan/EA). When fisher are not detected, flights would be as high as possible (while still close enough to obtain a signal), but aircraft would fly as low as 333 feet above the canopy or 500 feet above ground limit (whichever is higher) when fishers are detected in order to tract the signal. The number of locations obtained for each fisher would be limited by 1) the lifespan of radio-transmitters, 2) suitable weather conditions for flying, and 3) available funding for telemetry flights. Given potential limitations on data collection, the objective would be to get at least one location per week for individual fishers, with a maximum of five flights per month. Where access allows, telemetry would be completed by foot and mortalities and suspected den sites would be investigated on foot to collect the carcass or verify denning and reproduction. VHF implants are expected to last two years, maximum, but would remain implanted in the fisher throughout its life. These transmitters would likely never be located once the fisher dies. Flights would occur only so long as resource staff obtain signals from the VHF transmitters in the Mount Rainier Wilderness. Satellite collars are expected to last two years as well.

During fisher release years and one year post-release, the NPS would likely work with WDFW to place **temporary remote camera stations** in the backcountry of the Mount Rainier Wilderness **via foot** to detect repeated female visitation at suspected den sites and the presence of kits. These stations would be placed in areas with little visitor use and would be out-of-site for visitors. It assumed that there would be less of these stations needed in comparison to the other alternatives because less fishers would be present in MORA immediately following WDFW reintroduction in the SW Cascades under this alternative.

Because of the NPS' limited involvement in fisher reintroduction under this alternative and the lack of any reintroduction in the NW Cascades, fishers would not be restored to the Stephen Mather Wilderness, **the level of scientific understanding would be minimal in comparison** to other alternatives (one full reintroduction; not two), and the number of educational opportunities tied to fisher reintroduction would be limited to MORA only.

There would be no action within the Stephen Mather Wilderness under this alternative.

### Component Activities

*How will each of the components of the action be performed under this alternative?*

| Component of the Action | | Activity for this Alternative |
|---|---|---|
| 1 | Release fishers outside of wilderness | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. |
| 2 | Tracking device placed on released fishers (founding population only) | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested |
| 3 | Transportation of personnel to track founding population | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) |
| 4 | Transportation of personnel and tools to install temporary monitoring stations | Personnel and tools would be transported by foot (limited) |
| 5 | Temporary monitoring stations | Remote camera stations would be installed at areas of suspected denning activity (limited) |
| 6 | Condition of site after project | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) |
| 7 | Scientific understanding and enhanced educational opportunities | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only |

### Measuring Impacts

Because the other alternatives in this MRDG include two reintroductions in two wildernesses: the Mount Rainier Wilderness in MORA and the Stephen Mather Wilderness in NOCA, impacts were analyzed for these wildernesses separately under this alternative as well in order to be able to compare impacts to the wildernesses from all the alternatives (see tables below).

#### *Wilderness Character*

*What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?*

**Untrammeled**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 0 | NE | |
| **Untrammeled Total Rating** | | -2 | | | | | |

Explain:

By reintroducing fisher in the SW Cascades, when they have been extirpated by human actions, WDFW would be actively managing the Mount Rainier Wilderness through which and in which these animals are expected to travel and establish homeranges. This activity, along with implanting tracking devices in or placing tracking collars on fishers in wilderness, negatively impacts the untrammeled quality of wilderness character. This trammeling of wilderness character would be less than Alternatives 1-3 as 1) no fishers would be reintroduced in close proximity to the Mount Rainier Wilderness, and 2) fisher immigration to the wilderness would like be delayed in comparison to the other alternatives (i.e fewer "tracked" fishers in the Mount Rainier Wilderness).

The untrammeled quality of the Stephen Mather Wilderness would not be affected by this alternative.

**Undeveloped**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | satellite collars would be tested | | | | | | |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 3 | 0 | NE | |
| **Undeveloped Total Rating** | | **-3** | | | | | |

Explain:

Satellite collars, fixed wing flights, and placing temporary installations in the wilderness would have a short-term negative impact on the undeveloped quality of wilderness character in the Mount Rainier Wilderness. This alternative would like require slightly less of these developments than Alternatives 1-3 due to the decreased presence of fishers in the Mount Rainier Wilderness immediately following reintroduction (when the collars are functional).

The undeveloped quality of the Stephen Mather Wilderness would not be affected by this alternative.

**Natural**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☒ | ☐ | ☐ | ☐ | ☐ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☒ | ☐ | ☐ | ☐ | ☐ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 2 | 0 | 0 | 0 | NE | |
| **Natural Total Rating** | | **2** | | | | | |

Explain:

Although restoration of fishers in the Mount Rainier Wilderness would likely be delayed in comparison to the other alternatives, WDFW's actions to reintroduce fishers in the SW Cascades near MORA would have a moderate, long-term, beneficial impact on the naturalness of the Mount Rainier Wilderness because it would improve the processes and biodiversity of this wilderness ecosystem by completing the native predator guild within this wilderness which would have positive cascading effects on other species present. Fishers would continue to be extirpated from the Stephen Mather Wilderness – maintaining this degraded aspect of the natural quality of this wilderness' character.

**Solitude or Primitive & Unconfined Recreation**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☒ | ☐ | ☐ | ☐ | ☐ | ☒ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☒ | ☐ | ☐ | ☐ | ☐ | ☒ |
| Total Number of Effects | | 2 | 0 | 4 | 0 | NE | |
| **Solitude or Primitive and Unconfined Recreation Total Rating** | | **-2** | | | | | |

Explain:

No releases would occur close enough to the Mount Rainier Wilderness to impact wilderness visitors, and no NPS visitors would have the beneficial opportunity to participate in a release, as opposed to the other alternatives (component 1). However, knowing fishers have been restored to the wilderness, having the slim, though real, chance to see a fisher in the wild and in its native

habitat, and having enhanced opportunities to learn about fisher reintroduction would have a long-term beneficial impact on opportunities for primitive and unconfined recreation for both visitors to the Mount Rainier Wilderness and non-visitors alike (components 6 and 7). While the increased likelihood of seeing a fisher in the wild would be a long-term beneficial impact to the wilderness character of the Mount Rainier Wilderness, if a visitor happened to see a fisher collared (which is assumed unlikely in this alternative because of fewer collars used and fewer founding fishers present in the Mount Rainier Wilderness), it would diminish this beneficial impact. Because fishers have large homeranges and tend to be dispersed throughout remote areas, the chances of seeing a fisher, much less one that is collared, in the backcountry, particularly along traveled trails and in campgrounds, would likely be extremely low.

Seeing NPS personnel in the backcountry, finding a remote camera station (through rare, this has happened), and seeing/hearing fixed-wing aircraft associated monitoring would have a short-term negative impact on visitors' opportunities for solitude in the wilderness. This alternative would require less flights and less temporary camera stations than the other alternatives as fisher restoration in the Mount Rainier Wilderness would be delayed under this alternative and less trackable fishers would be present to monitor.

The Stephen Mather Wilderness and its quality of solitude and primitive and unconfined recreation would not be affected by this alternative.

**Other Features of Value**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☒ | ☐ | ☐ | ☐ | ☐ | ☒ |
| Total Number of Effects | | 1 | 0 | 0 | 0 | NE | |
| **Other Features of Value Total Rating** | | 1 | | | | | |

Explain:

The monitoring activities that would accompany reintroduction in the SW Cascades would inform

future reintroduction efforts of native species – a long-term benefit to scientific understanding of these processes and educational benefit to visitors. The experimental use of emerging technology, such as satellite collars, would also enhance future restoration and species monitoring efforts.

***Other Criteria***

*What is the effect of each component activity on other comparison criteria? What mitigation measures will be taken?*

**Maintaining Traditional Skills**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | NE | |
| **Maintaining Traditional Skills Total Rating** | | **0** | | | | | |

Explain:

No action in this alternative helps to maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

**Special Provisions**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☒ | ☐ | ☐ | ☐ | ☒ | ☒ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 0 | 0 | **NE** | |
| **Special Provisions Total Rating** | | **0** | | | | | |

Explain:

No special provisions are impacted by this alternative.

**Economics & Time Constraints**

| Component Activity for this Alternative | | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 4 | Personnel and tools would be transported by foot (limited) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☒ | ☒ | ☐ | ☐ | ☐ | ☐ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☐ | ☐ | ☒ | ☒ | ☐ | ☐ |
| Total Number of Effects | | 5 | 5 | 2 | 2 | NE | |
| **Economics & Time Constraints Total Rating** | | **6** | | | | | |

Explain:

**Impacts under economic and time constraints are in comparison to other alternatives.** Because the NPS would not be taking action, this alternative would come at essentially no cost to the NPS. Therefore, a "positive" impact for economic costs and time constraints is given for all action components for this alternative.

However, there would be no benefit (objectives not met) to the NW Cascades and the Stephen Mather Wilderness, and even though WDFW would restore fishers to the SW Cascades which are expected to eventually immigrate to the Mount Rainier Wilderness, restoration would be delayed; hence the negative rating in comparison to other alternatives.

### *Safety of Visitors & Workers*

*What is the effect of each component activity on the safety of visitors and workers? What mitigation measures will be taken?*

**Safety of Visitors & Workers**

| | Component Activity for this Alternative | Positive | | Negative | | No Effect | |
|---|---|---|---|---|---|---|---|
| | | MORA | NOCA | MORA | NOCA | MORA | NOCA |
| 1 | WDFW would release 80 fishers outside of MORA and the Mount Rainier Wilderness in the SW Cascades. No fishers would be reintroduced to the NW Cascades. | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 2 | VHF radio-transmitters would be implanted in fishers; satellite collars would be tested | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 3 | Weekly aerial telemetry would be completed with fixed wing aircraft: 500' agl in areas where fisher are detected (limited) | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 4 | Personnel and tools would be transported by foot (limited) | ☐ | ☐ | ☒ | ☐ | ☐ | ☒ |
| 5 | Remote camera stations would be installed at areas of suspected denning activity (limited) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 6 | Ample information to ensure all objectives are met in MORA; objectives not met for NOCA (see chapter 1 of Plan/EA) | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| 7 | Scientific understanding would be minimally improved. Educational opportunities offered in MORA only | ☐ | ☐ | ☐ | ☐ | ☒ | ☒ |
| Total Number of Effects | | 0 | 0 | 2 | 0 | NE | |
| **Safety of Visitors & Workers Total Rating** | | -2 | | | | | |

Explain:

Fixed wing aircraft flights are a high risk activity and pose a threat to staff safety; however, this alternative would likely require less flights than Alternatives 1-3 due to the use of satellite collars on some fishers and the reduced number of fishers (and therefore needed monitoring) in the Mount Rainier Wilderness immediately following reintroduction. Given the terrain of both wildernesses and the remote locations that fishers are expected to inhabit, traveling by foot to den-sites, etc. is also a risky activity that demands that considerations for human health and safety be made during trip planning. No action would be taken in the Stephen Mather Wilderness.

**Summary Ratings for Alternative 4**

| Wilderness Character | |
|---|---|
| Untrammeled | -2 |
| Undeveloped | -3 |
| Natural | 2 |
| Solitude or Primitive & Unconfined Recreation | -2 |
| Other Features of Value | 1 |
| **Wilderness Character Summary Rating** | **-4** |

| Other Criteria | |
|---|---|
| Maintaining Traditional Skills | 0 |
| Special Provisions | 0 |
| Economics & Time Constraints | 6 |
| **Other Criteria Summary Rating** | **6** |

| Safety | |
|---|---|
| Safety of Visitors & Workers | -2 |
| **Safety Summary Rating** | **-2** |

## Alternative Comparison

| | |
|---|---|
| Alternative 1: | **VHF Collars and Aerial Telemetry; Hair-Snares and Remote Camera Stations Installed by Foot** |
| Alternative 2: | **Implanted VHF Transmitters & Aerial Telemetry; Hair-Snares & Remote Camera Stations Installed by Foot** |
| Alternative 3: | **Satillite Collars Tested; Hair-Snares & Remote Camera Stations Installed by Foot** |
| Alternative 4: | **No Action: No NPS Fisher Reintroductions in MORA and NOCA; Limited monitoring in MORA tied to WDFW actions** |

| Wilderness Character | Alt 1 | | Alt 2 | | Alt 3 | | Alt 4 | |
|---|---|---|---|---|---|---|---|---|
| | + | - | + | - | + | - | + | - |
| Untrammeled | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 2 |
| Undeveloped | 0 | 6 | 0 | 4 | 0 | 6 | 0 | 3 |
| Natural | 4 | 0 | 4 | 0 | 4 | 0 | 2 | 0 |
| Solitude or Primitive & Unconfined Rec. | 6 | 8 | 6 | 6 | 6 | 8 | 2 | 4 |
| Other Features of Value | 2 | 0 | 2 | 0 | 2 | 0 | 1 | 0 |
| *Total Number of Effects* | *12* | *18* | *12* | *14* | *12* | *18* | *5* | *9* |
| Wilderness Character Rating | -6 | | -2 | | -6 | | -4 | |

| Other Criteria | Alt 1 | | Alt 2 | | Alt 3 | | Alt 4 | |
|---|---|---|---|---|---|---|---|---|
| | + | - | + | - | + | - | + | - |
| Maintaining Traditional Skills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Special Provisions | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Economics & Time Constraints | 2 | 12 | 4 | 10 | 6 | 8 | 10 | 4 |
| *Total Number of Effects* | *2* | *12* | *4* | *10* | *6* | *8* | *10* | *4* |
| Other Criteria Rating | -10 | | -6 | | -2 | | 6 | |

| Safety | Alt 1 | | Alt 2 | | Alt 3 | | Alt 4 | |
|---|---|---|---|---|---|---|---|---|
| | + | - | + | - | + | - | + | - |
| Safety of Visitors & Workers | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 2 |
| Safety Rating | -4 | | -4 | | -4 | | -2 | |

## Alternatives Not Analyzed

*What alternatives were considered by not analyzed? Why were they not analyzed?*

**No or Limited Monitoring (limit frequency of aerial telemetry flights/limited number of camera stations, etc.):** Monitoring is needed for NPS managers to ensure that fisher reintroductions in the SW and NW Cascades are implemented in the most effective manner that will ensure the greatest likelihood for success, and in fact, NPS *Management Policies 2006* call for each park to integrate the "best available science" and "best available technology" "to restore the biological and physical components of [ecosystems], accelerating both their recovery and the recovery of landscape and biological community structure and function". Therefore, placing additional, somewhat arbitrary, limitations (beyond those that already exist due to technology (device failure, restricted data, etc.) and natural processes (weather, etc.)) on the ability of resource managers to be able to gather scientific information that could lead to more effective releases in later years of the reintroduction effort and protect the species into the future is not considered a viable alternative.

**No tracking devices on any fishers reintroduced in the SW and NW Cascades:** This is not a viable alternative because WDFW is leading the fisher reintroduction process outside of NPS boundaries, and the NPS has no authority to change WDFW procedures, particularly as they are in line with best scientific practices.

**Track fishers using satellite collars only:** Although satellite technology does not require aerial overflights for most monitoring, current designs are too large and heavy for their use on female fishers and therefore cannot be used on all fishers in the reintroduction effort. However, as technology is advancing rapidly, Alternative 3 allows for the use of satellite collars on adult male fishers on a trial basis in the first year of the first reintroduction. If found to be effective, and technology advances to meet project needs (e.g. reduction in size and weight), project managers would closely evaluate their use and could increase the use of satellite collars during project implementation. Currently, VHF radio transmitters are the only devices available that meet the full monitoring needs and objectives of this proposed project. If, during the course of this project, technology advances where satellite transmitters would be suitable and they are shown to be effective for the purposes of this project, Alternative 3 would allow this emerging technology to be used in future years of project implementation (see *Adaptive Management* in the Plan/EA).

**Complete telemetry solely by foot:** Radio telemetry signals are by far too weak to be able to effectively complete telemetry by foot throughout the Mount Rainier and Stephen Mather Wildernesses. As incorporated in every alternative: "Where access allows, telemetry would be completed by foot and mortalities and suspected den sites would be investigated on foot to collect the carcass or verify denning and reproduction".

**Telemetry will only occur before memorial day and after labor day to avoid high periods of visitor use:** Although telemetry would focus most heavily on the denning period (spring, prior to memorial day), consistent measurements are necessary throughout the year in order to monitor dispersal, the establishment of homeranges, and mortalities. This information provides resource managers with the tools to adaptively manage future releases and determine whether or not the species is successfully recovering within the Mount Rainier and Stephen Mather Wilderenesses.

**Place hair snares and remote camera stations via helicopter or stock:** Because these stations can be set up by foot, there was no need to evaluate the use of a prohibited use or more intensive use in wilderness.

## Decision

Refer to the MRDG Instructions before identifying the selected alternative and explaining the rationale for the selection.

### Selected Alternative

| | | |
|---|---|---|
| ☐ | Alternative 1: | VHF Collars and Aerial Telemetry; Hair-Snares and Remote Camera Stations Installed by Foot |
| ☐ | Alternative 2: | Implanted VHF Transmitters & Aerial Telemetry; Hair-Snares & Remote Camera Stations Installed by Foot |
| ☒ | Alternative 3: | Satillite Collars Tested; Hair-Snares & Remote Camera Stations Installed by Foot |
| ☐ | Alternative 4: | No Action: No NPS Fisher Reintroductions in MORA and NOCA; Limited monitoring in MORA tied to WDFW actions |

Explain Rationale for Selection:

When comparing the alternatives considered above, the planning staff for this project noted that almost all beneficial impacts to wilderness character identified in this MRDG would have at least moderate benefits to wilderness character that would last in perpetuity; whereas all adverse impacts to wilderness character would be mostly negligible, transient, short-term (not lasting more than three years), and in some cases, very unlikely to occur. Therefore, the numerical ratings in the "Alternatives Comparison" table are not sufficient on their own to evaluate and compare these alternatives.

For example, Alternative 4, while having the "best" overall score (0), does not adequately address the situation as described under Step 1 as fisher would not be restored to the Stephen Mather Wilderness. Therefore, although this alternative serves as a good comparison for the other alternatives, it is dismissed from further consideration.

Alternative 1 is also dismissed from further consideration as it clearly has the worst overall score (-20) and uses an older technology (VHF collars on all 160 fishers) that has wilderness impacts (introduces a man-made device in wilderness and would be visible to visitors if they saw such a device on a fisher) above those from Alternatives 2 and 3, without the benefit of additional information, as gathered by a satellite collar, in Alternative 3.

While Alternatives 2 and 3 have the same overall score (-12), it appears from the numerical ratings that Alternative 3 has less wilderness impacts than Alternative 2. However, this is not a fair assessment. The four-point difference between the two alternatives in the scoring under wilderness character is because, all other impacts scored similarly (i.e. presence of impact), Alternative 3 would use satellite collars in a pilot program that would impact the undeveloped quality of wilderness character from its mere presence and the solitude quality of wilderness character from the extremely low likelihood of a visitor seeing a collar on a fisher. Neither of these impacts are considered more than negligible due to predicted low use of satellite collars (five of the 40 fishers would have satellite collars in year one under this alternative) and the already rare opportunity for visitors to see a fisher in the wild, much less one with a satellite collar. What the scores do not show is that Alternative 3 would require less aerial telemetry than Alternative 2 (a smaller impact to undeveloped for this component), would result in additional benefits to scientific understanding (additional benefit to other features of value), and could ensure a more successful reintroduction (additional benefits to natural). Furthermore, the use of satellite collars in a pilot program under Alternative 3 would adhere to NPS policies in using the best available

technology for restoring a species to its native habitat. Obviously, the planning staff for this project has some concerns about satellite collars and acknowledges that the technology is not ready for full scale implementation; hence the dismissal of use of satellite collars on all reintroduced fishers to the SW and NW Cascades (see "Alternatives not Analyzed"). However, if these collars are proven to be effective (in that they have little impact to fisher, they are light enough for females to carry, they provide good data collection, there are few instances of collars falling off animals, and the collar has an extended life, etc.), these collars could reduce impacts to wilderness character and enhance the outcomes of fisher restoration in the SW and NW Cascades.

Therefore, Alternative 3, which includes a pilot program for the use of satellite collars, is determined to be the minimum tool to implement fisher restoration in the Mount Rainier and Stephen Mather Wildernesses.

Describe Monitoring & Reporting Requirements:

All aerial telemetry flights over MORA or NOCA must be reported to the aviation coordinator at each respective park at the end of the year. Report should include flight hours and type of aircraft. Wildlife biologists at each park should also track the number of temporary camera stations installed in the wilderness as a result of monitoring fishers and the duration of operation of each station. This number should be reported to the wilderness district ranger on an annual basis.

## Approval of Prohibited Uses

*Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?*

| | | |
|---|---|---|
| ☐ | Mechanical Transport: | Use of Aerial Telemetry (years 1-3 in each wilderness): weekly flights over suitable fisher habitat with a small fixed wing aircraft. Maximum of five flights per month. Flights may go as low as 333 feet above canopy or 500 feet above ground limit (agl) (whichever is higher). Flights limited to Monday-Thursday whenever possible. |
| ☐ | Motorized Equipment: | |
| ☐ | Motor Vehicles: | |
| ☐ | Motorboats: | |
| ☐ | Landing of Aircraft: | |
| ☐ | Temporary Roads: | |
| ☐ | Structures: | |
| ☒ | Installations: | Temporary camera stations (yrs 1-3 in each wilderness): set up by foot, only in located where denning activity is suspected. Placed in areas with little visitor use and would be out-of-site for visitors. |

Refer to agency policies for the following review and decision authorities:

| | | | |
|---|---|---|---|
| Prepared | Name | Position | |
| | Elizabeth Boerke | Environmental Protection Specialist | |
| | Signature | | Date |
| | | | |

| | | | |
|---|---|---|---|
| Recommended | Name | Position | |
| | Kraig Snure | Wilderness District Ranger, Mount Rainier National Park | |
| | Signature | | Date |
| | | | |

| | | | |
|---|---|---|---|
| Recommended | Name | Position | |
| | Jack Oelfke | Acting Wilderness Coordinator, North Cascades National Park Service Complex | |
| | Signature | | Date |
| | | | |

| | | | |
|---|---|---|---|
| Approved | Name | Position | |
| | Randy King | Superintendent, Mount Rainier National Park | |
| | Signature | | Date |
| | | | |

| | | | |
|---|---|---|---|
| Approved | Name | Position | |
| | Karen F. Taylor-Goodrich | Superintendent, North Cascades National Park Service Complex | |
| | Signature | | Date |
| | | | |