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

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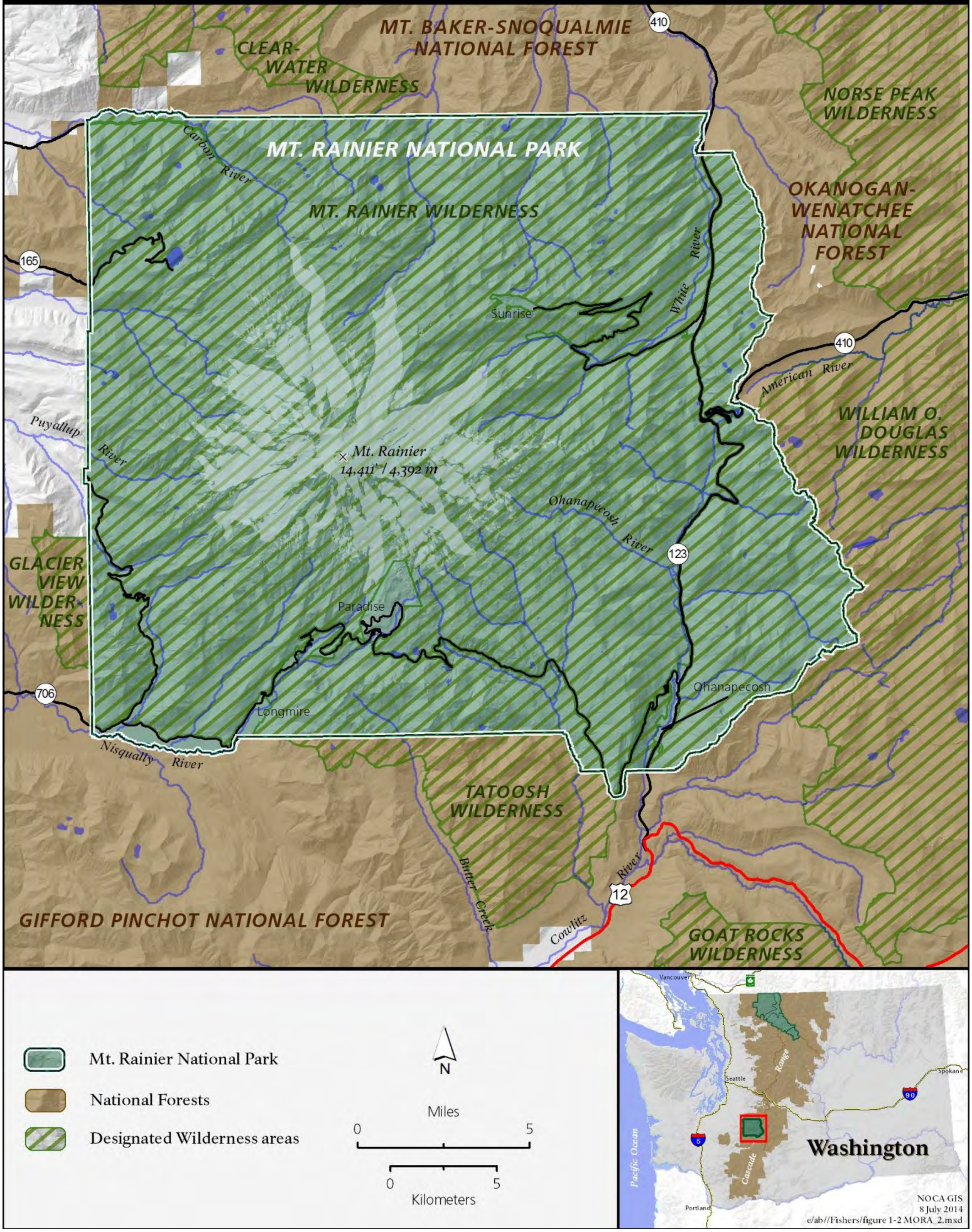

occurs at low elevations (610 to 915 m). The dominant trees in this zone are very old (700 to 1,000 years) Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and red cedar (*Thuja plicata*). Other features of this zone include a well-developed multilayered canopy with numerous 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

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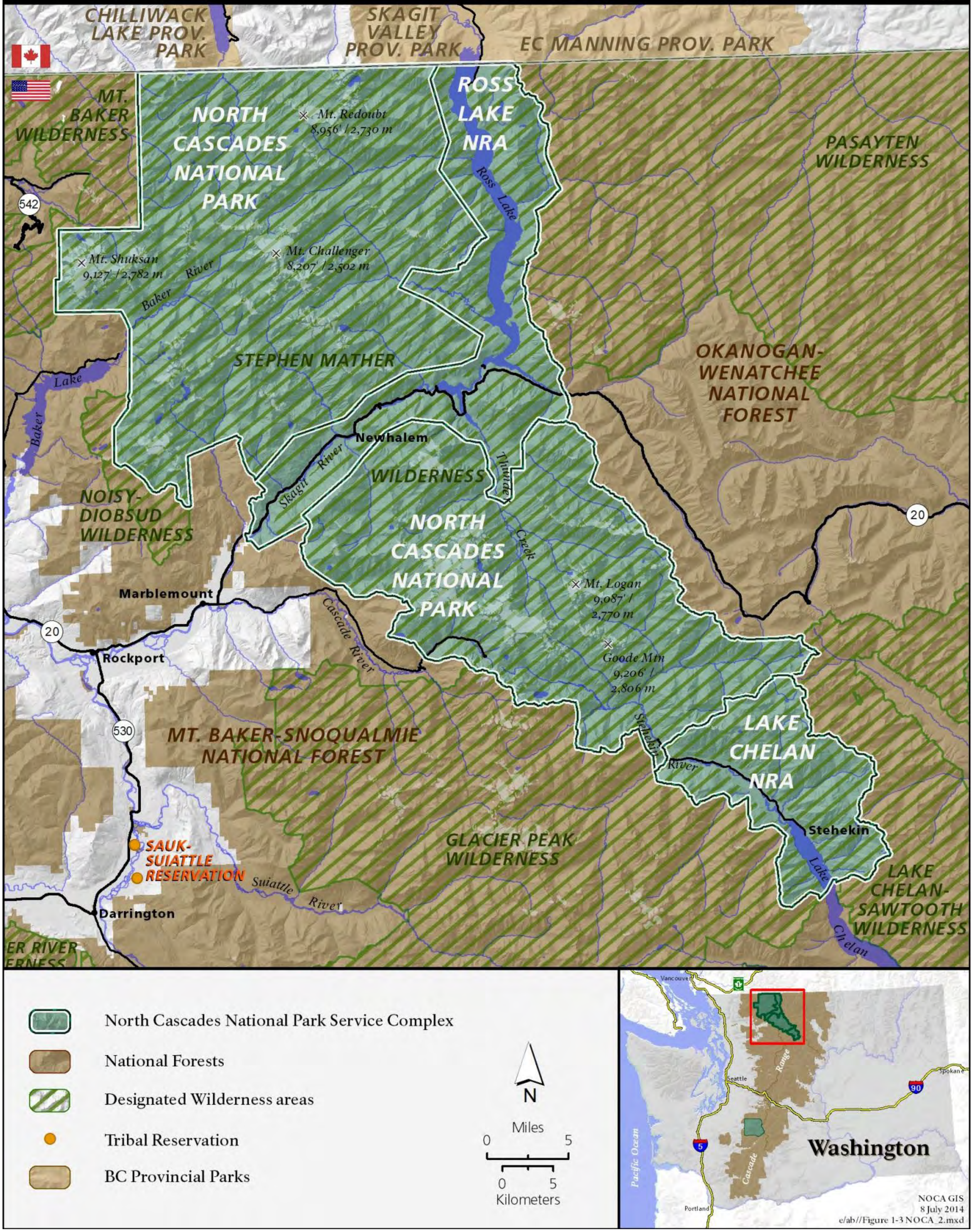


Birds that are prevalent in NOCA include the common raven, varied thrush, winter wren, Steller's jay, gray jay, sooty grouse, spruce grouse (*Falcipennis canadensis),* bald eagle (*Haliaeetus leucocephalus*), and a variety of warblers, woodpeckers, kinglets (*Regulus* spp.), and sparrows. The sharp-shinned 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).

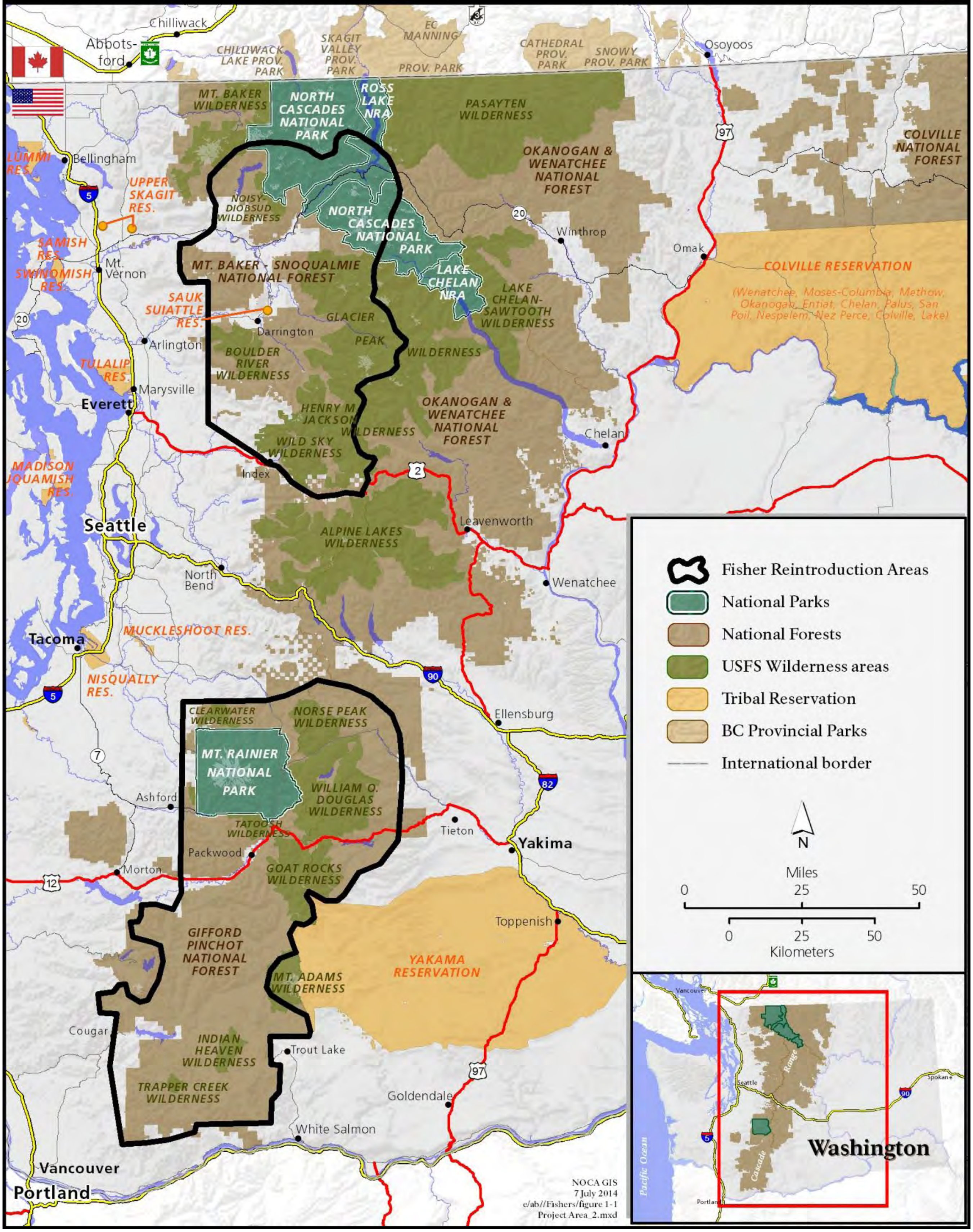
The second stage of the reintroduction would be the release and monitoring of 80 fishers in the NW Cascades reintroduction area, and this second stage would follow the approach and contingencies outlined above for stage one in the SW Cascades reintroduction area. Fishers would not be released in the 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

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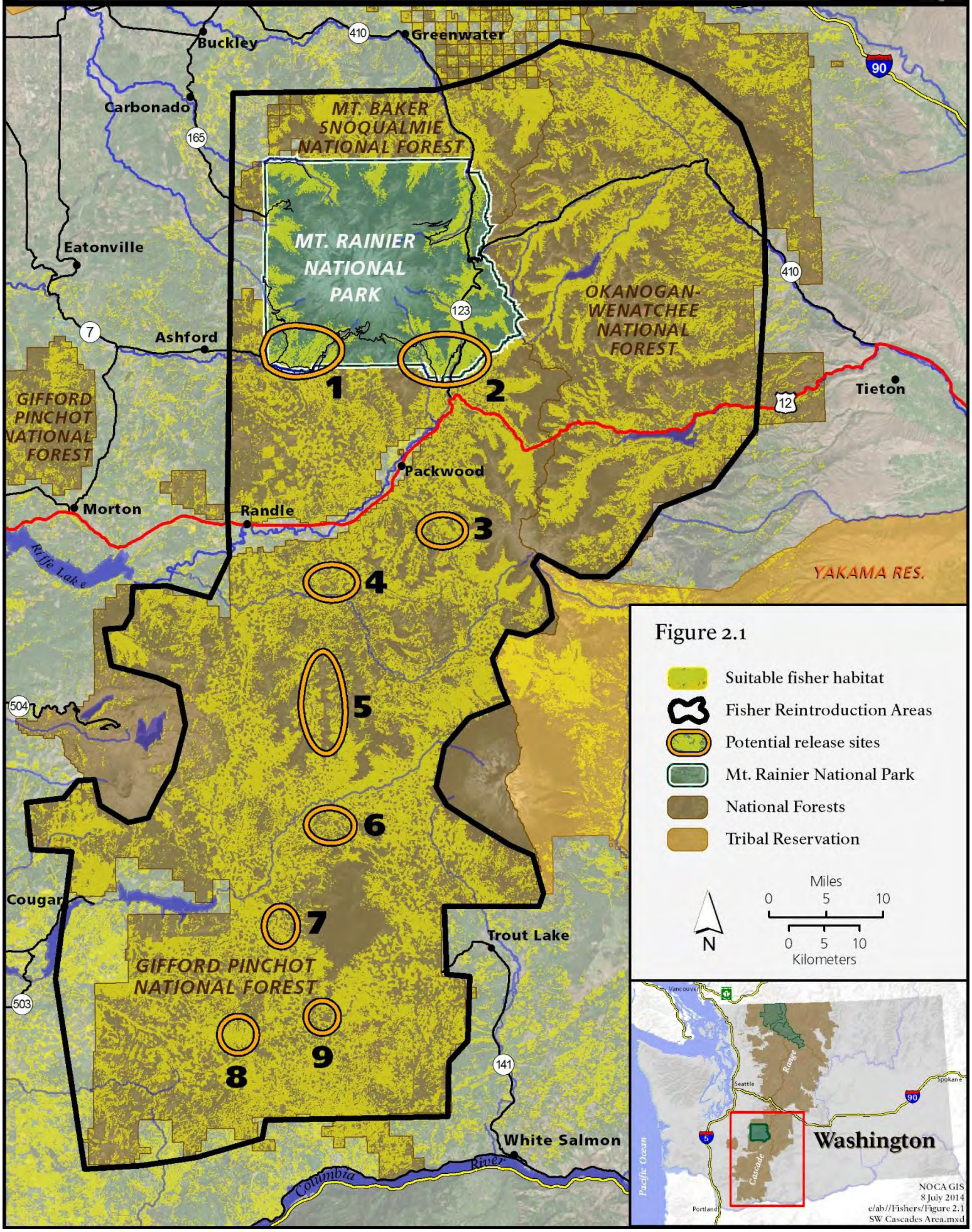
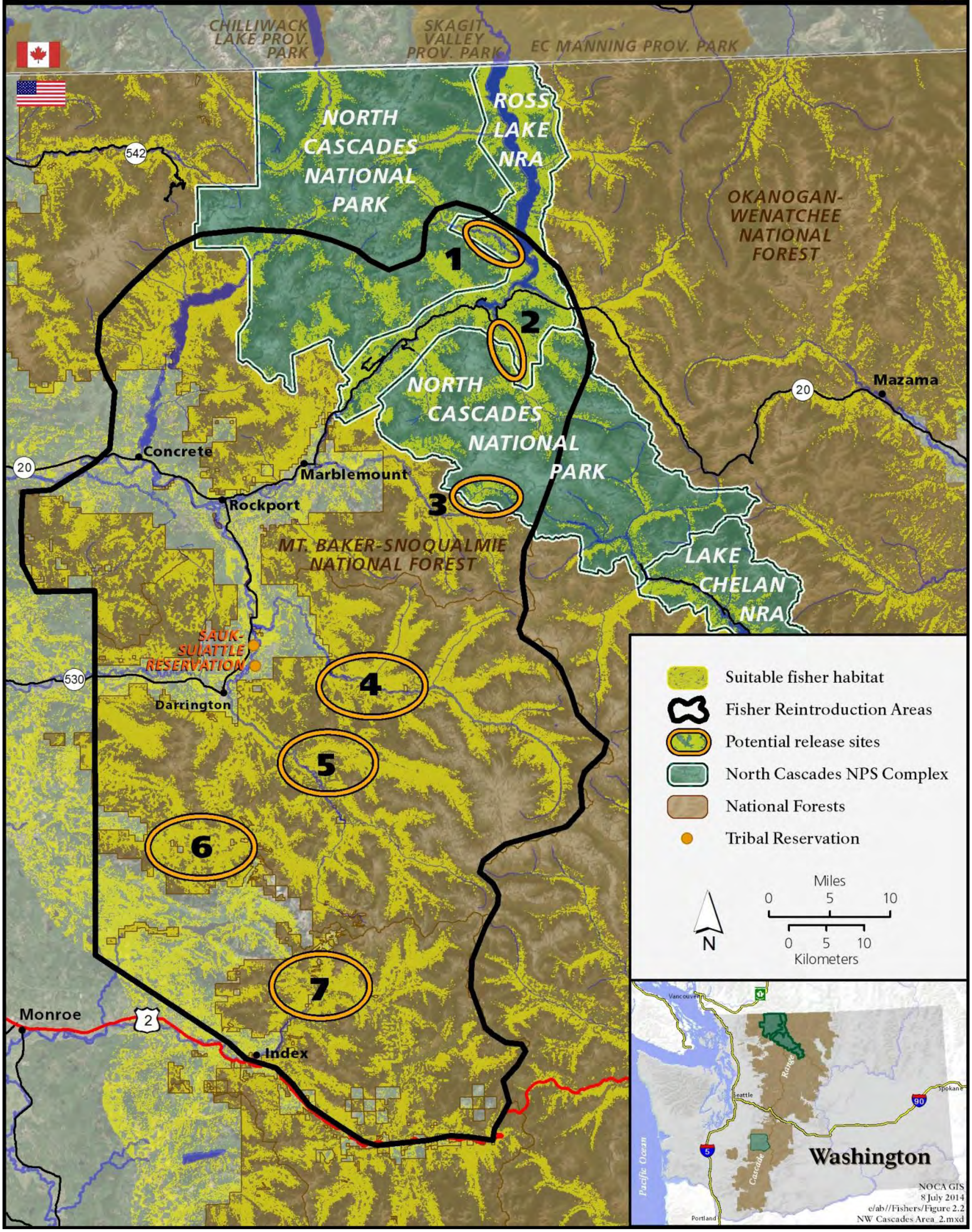


Figure 5: Northwestern Cascades Reintroduction Area

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 20th 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.

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