U.S. Department of the Interior
U.S. Fish and Wildlife Service
National Park Service

Draft Grizzly Bear Restoration Plan / Environmental Impact Statement

NORTH CASCADES ECOSYSTEM

January 2017

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE AND U.S. FISH AND WILDLIFE SERVICE
NORTH CASCADES ECOSYSTEM
DRAFT GRIZZLY BEAR RESTORATION PLAN / ENVIRONMENTAL IMPACT STATEMENT

Lead Agencies: National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS), U.S. Department of the Interior

This draft *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (draft plan/EIS) evaluates the impacts of a range of alternative approaches for determining how to restore the grizzly bear to the North Cascades Ecosystem grizzly bear recovery zone, a portion of its historical range. Upon conclusion of the draft plan/EIS and decision-making process, the alternative selected for implementation will become the North Cascades Ecosystem Grizzly Bear Restoration Plan.

This draft plan/EIS evaluates the impacts of the no-action alternative (alternative A) and three action alternatives (alternatives B, C, and D). All action alternatives would seek to achieve a grizzly bear restoration goal of 200 bears. The no-action alternative (alternative A) would be a continuation of existing management practices and assumes no new management actions would be implemented. "Alternative B: Ecosystem Evaluation Restoration" would seek to release up to 10 grizzly bears within the first 2 years of implementation, then monitor those bears for habitat use and human conflict through year 4. During year 4, managers would decide whether to repeat the initial releases of up to 10 bears over 2 years or switch to implementing alternative C. "Alternative C: Incremental Restoration" would seek to reestablish grizzly bear reproduction in the ecosystem by releasing up to 25 bears over 5 to 10 years. "Alternative D: Expedited Restoration" would seek to expedite grizzly bear restoration by releasing a sufficient number of bears that result in a population of 200 bears on the landscape, including bears added through reproduction, over approximately 25 years. In addition to the primary actions of each alternative, a number of elements would be common to the action alternatives. These elements include the restoration goal of 200 bears; guidelines for human-grizzly bear conflicts; capture, release and monitoring techniques; public education and involvement; access management; and habitat management. The option to designate the grizzly bear population as experimental under section 10 of the *Endangered Species Act* pursuant to a special rulemaking process is also considered. This environmental impact statement provides the *National Environmental Policy Act* impact analysis to support the development of such a rule.

The draft plan/EIS analyzes the potential environmental impacts on wildlife and fish (including grizzly bears), wilderness, visitor use and recreational experience, public and employee safety, socioeconomics, and ethnographic resources.

The review period for this document will end 60 days after publication of the U.S. Environmental Protection Agency Notice of Availability in the *Federal Register*. During the comment period, comments will be accepted electronically through the NPS Planning, Environment, and Public comment website and in hard copy delivered by the U.S. Postal Service or other mail delivery service or by hand to the following address: Superintendent, North Cascades National Park Service Complex, 810 State Route 20, Sedro-Woolley, WA 98284. Written comments will also be accepted during public meetings. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted. For further information, visit www.parkplanning.nps.gov\grizzlydeis.

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EXECUTIVE SUMMARY

The National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS) have prepared this draft *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (draft plan/EIS) in accordance with the *National Environmental Policy Act* of 1969 (NEPA), as amended, to determine how to restore the grizzly bear to the North Cascades Ecosystem (NCE), a portion of its historical range. This draft plan/EIS includes an assessment of the potential impacts of various alternatives for grizzly bear restoration in the NCE to the environment, including cultural and socioeconomic resources. Each of the chapters of this draft plan/EIS is summarized in the following pages.

PURPOSE AND NEED

Chapter 1 of the plan/EIS, "Purpose of and Need for Action," describes why NPS and FWS are taking action at this time with respect to the restoration of grizzly bears to the NCE.

Background

The grizzly bear (*Ursus arctos horribilis*) was listed as threatened under the *Endangered Species Act* (ESA) on July 28, 1975. Following the listing, the FWS initiated a recovery effort directed at establishing viable populations in portions of four states where the grizzly bear was known or believed to exist at the time of listing. The remaining grizzly bears in the western United States are managed within six recovery zones: the Greater Yellowstone Ecosystem (GYE) grizzly bear recovery zone in Wyoming and southwest Montana; the Northern Continental Divide Ecosystem (NCDE) grizzly bear recovery zone in northwest Montana; the Cabinet-Yaak Ecosystem (CYE) grizzly bear recovery zone in extreme northwestern Montana and the northern Idaho panhandle; the Selkirk Ecosystem (SE) grizzly bear recovery zone in northern Idaho and northeastern Washington; the Bitterroot Ecosystem (BE) grizzly bear recovery zone in central Idaho and western Montana; and the NCE grizzly bear recovery zone in northwestern and north-central Washington.

The greater NCE constitutes a large block of contiguous habitat that spans the international border between the United States and Canada, but is isolated from grizzly bear populations in other parts of the two countries. The U.S. portion of the ecosystem spans the crest of the Cascade Range from the temperate rainforests of the west side to the dry ponderosa pine forests and sage-steppe on the east side, and comprises one of the most intact wildlands in the contiguous United States. Historical records indicate that grizzly bears once occurred throughout the NCE. A grizzly bear habitat evaluation was conducted from 1986 to 1991 in response to recommendations made in the 1982 FWS nationwide *Grizzly Bear Recovery Plan*. This habitat evaluation, along with a subsequent report by the Interagency Grizzly Bear Committee (IGBC) technical committee review team, concludes that the U.S. portion of the NCE contains sufficient habitat quality to maintain and recover a grizzly bear population (Servheen et al. 1991; Almack et al. 1993). More recent carrying capacity modeling suggests the most plausible carrying capacity for the U.S. portion of the NCE is approximately 280 bears (Lyons et al. 2016).

The overall population status of the grizzly bear in the greater NCE is unknown; however, it is highly unlikely that the NCE contains a viable grizzly bear population. There have been only four confirmed detections of grizzly bears in the greater NCE in the past 10 years, all of which occurred in British Columbia and may comprise only two individuals (IGBC NCE Subcommittee 2016). Because of the small documented number of grizzly bears, very slow reproductive rate, and other recovery constraints, the grizzly bear in the NCE was found by the FWS to be warranted for uplisting to endangered status, but was precluded by higher-priority listings (FWS 2016a). Because there has been no confirmed evidence of

grizzly bears within the NCE in the United States since 1996 (IGBC NCE Subcommittee 2016), any remaining bears in the NCE do not meet the accepted definition for a population (i.e., evidence of 2 adult females with cubs or 1 adult female tracked through two litters) (FWS 2000a).

Purpose and Need

The purpose of this draft plan/EIS is to determine how to restore the grizzly bear to the NCE, a portion of its historical range.

Grizzly bears in the NCE are at risk of local extinction. As a result, the proposed action is necessary to accomplish the following:

- Avoid the permanent loss of grizzly bears in the NCE.
- Contribute to the restoration of biodiversity of the ecosystem for the benefit and enjoyment of present and future generations of people.
- Enhance the probability of long-term survival of grizzly bears in the NCE and thereby contribute to overall grizzly bear recovery.
- Support the recovery of the grizzly bear to the point where it can be removed from the federal list of threatened and endangered wildlife species.

Objectives in Taking Action

Objectives are more specific statements of purpose that provide additional bases for comparing the effectiveness of alternatives in achieving the desired outcomes of an action (NPS 2015a). The objectives of this draft plan/EIS are to:

- Restore a grizzly bear population as part of the natural and cultural heritage of the North Cascades.
- Provide Pacific Northwest residents and visitors with the opportunity to again experience grizzly bears in their native habitat.
- Seek to support tribal cultural and spiritual values, as well as environmental and natural resource objectives related to the grizzly bear.
- Expand outreach efforts to inform and involve the public, and build understanding about grizzly bear recovery.

Issues and Impact Topics

The NPS and FWS identified a range of issues and impact topics to evaluate in this draft plan/EIS to determine the potential impacts on the human environment that could result from implementation of the alternatives. Issues were analyzed in depth for the following impact topics:

- Grizzly bears
- Other wildlife and fish
- Wilderness character
- Visitor use and recreational experience

- Public and employee safety
- Socioeconomics
- Ethnographic resources

ALTERNATIVES CONSIDERED

Chapter 2 of the draft plan/EIS, "Alternatives," describes the various short- and long-term actions that the NPS and FWS could implement for grizzly bear restoration in the NCE. The alternatives under consideration in this plan/EIS include a required "no-action" alternative plus three action alternatives that were developed by an interdisciplinary planning team and feedback from the public, other agencies, and the scientific community during the planning process. Upon conclusion of the draft plan/EIS and decision-making process, one of the alternatives, or a combination of actions from multiple alternatives, will become the grizzly bear restoration plan. The plan will guide future NPS and FWS actions related to grizzly bear restoration in the NCE for the foreseeable future, until conditions necessitate that the plan be revised.

Alternative A (No Action)

Under alternative A (no action), existing management practices would be followed, and no new management actions would be implemented beyond those available at the outset of the grizzly bear restoration planning process. Management actions would be focused on improved sanitation, poaching control, motorized access management, outreach, and educational programs to provide information about grizzly bears and grizzly bear recovery to the public, and research and monitoring to determine grizzly bear presence, distribution, habitat, and home ranges. Based on the Revised Code of Washington 77.12.035, described in chapter 1, alternative A is the only alternative being evaluated in detail that would allow for the full participation by the state of Washington.

Elements Common to All Action Alternatives

All of the action alternatives would seek to restore a self-sustaining population of at least 200 bears through the capture and release of grizzly bears into the NCE. Each of the action alternatives would involve a similar approach to the capture, transport, and release of grizzly bears; enhanced public education and outreach; guidelines for management actions to respond to human-grizzly bear conflicts; and a similar approach for the replacement or additional releases of grizzly bears, access management, and habitat management.

Alternative B—Ecosystem Evaluation Restoration

Under alternative B, "Ecosystem Evaluation Restoration," the NPS and FWS would implement an ecosystem evaluation approach to grizzly bear restoration, wherein a total of up to 10 grizzly bears would be captured from source populations in northwestern Montana and/or south-central British Columbia and released at a single remote site on NPS or U.S. Forest Service (USFS) lands in the NCE over two consecutive summers. Grizzly bears that would be considered appropriate candidates for capture and release would be typically independent subadults between 2 and 5 years of age that had not yet reproduced and had exhibited no history of human conflict. The target sex ratio for initial releases would be approximately 60% to 80% female and 20% to 40% male. No additional releases of grizzly bears would occur for 2 years following the initial releases, except for the replacement of grizzly bears lost due to mortality, emigration, or removal due to human conflict. Instead, the grizzly bears released during the first 2 years (years 1 and 2) would be monitored for an additional 2 years (years 3 and 4) for habitat use

and instances of human conflict. In the fourth year, a decision would be made regarding how management would proceed during subsequent releases. Depending on the results of the monitoring information, the NPS and FWS may choose to repeat the initial release, where an additional 10 bears would be released at a single site over 2 years followed by 2 additional years of monitoring. Alternatively, the NPS and FWS could decide to transition to "Alternative C—Incremental Restoration." Alternative B is expected to achieve the restoration goal of approximately 200 grizzly bears within 60 to 100 years.

Alternative C—Incremental Restoration

Under alternative C, "Incremental Restoration," the NPS and FWS would release approximately 5 to 7 grizzly bears into the NCE each year over roughly 5 to 10 years, with a goal of establishing an initial population of 25 grizzly bears. Grizzly bears would be released at multiple remote sites on NPS and USFS lands, which would be located in close proximity to one another to facilitate interaction and breeding among released grizzly bears. Grizzly bears released into the U.S. portion of the NCE under alternative C would be selected based on the same criteria for sex/age class, reproductive status, and no history of human conflict described under alternative B. After the initial population goal of 25 grizzly bears has been reached, additional bears would likely be released into the ecosystem over time to address mortality, population and demographic trends, genetic limitations, distribution, or to adjust the population's sex ratio to improve reproductive success. Grizzly bears could be removed or relocated based on conflicts with humans. Subsequent release sites would continue to be evaluated and selected based on longer-term monitoring of grizzly bear habitat use and movements. Release sites may be removed from use based on factors such as mortality, out-migration, or human-bear conflict. Alternative C is expected to result in the achievement of the restoration goal of approximately 200 grizzly bears within 60 to 100 years.

Alternative D—Expedited Restoration

Under alternative D, "Expedited Restoration," the NPS and FWS would seek to expedite grizzly bear restoration by releasing additional grizzly bears into the NCE over time until the restoration goal is reached. This alternative would not limit the population goal for the initial restoration phase to 25 animals and would not set a limit for the number of grizzly bears released into the NCE. Rather, the number of suitable grizzly bears captured in a given year would be released. It is anticipated that the logistics and capacity of management agencies to carry out capture and release would constrain the ability to release a large number of grizzly bears in any single year under this alternative (the actual number of grizzly bears to be released per year would likely be 5 to 7). Capture and release efforts would continue each year as necessary until a combination of release efforts and reproduction results in a population of approximately 200 grizzly bears on the landscape. Criteria for age and sex ratios for grizzly bears captured and released under alternative D would be less restrictive than under alternatives B and C. Grizzly bears up to 10 years old would be targeted for capture and release, and the sex ratio could be as many as 1 male for every 2 females. Similar to alternative C, grizzly bears would be released at multiple remote sites on NPS and USFS land based on habitat criteria. Once the restoration goal under alternative D is achieved, subsequent releases would be unlikely. However, grizzly bears would be monitored for genetic diversity and if necessary additional grizzly bears may be added over time. Alternative D is expected to result in the achievement of the restoration goal of approximately 200 grizzly bears within roughly 25 years.

Endangered Species Act Section 10(j) Designation Rulemaking Option

Grizzly bears released into the NCE would be managed as threatened species under the ESA under all action alternatives. However, an option would be available under any of the action alternatives to designate grizzly bears in the U.S. portion of the NCE as a 10(j) experimental population under section 10 of the ESA. An experimental population is a group of reintroduced plants or animals that is geographically isolated from other populations of the species that is typically determined to be "essential" or "nonessential" to the survival of the species as a whole but contributes to their recovery. Section 10(j) provides for the reintroduction of experimental populations under special regulations and may include protective regulations established under authority of section 4(d) of the ESA.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter 3 of the draft plan/EIS describes the affected environment in the NCE as it pertains to the consequences of the alternatives for each impact topic considered. Chapter 4 analyzes the potential environmental consequences of the actions associated with the alternatives on these impact topics. The following provides a summary of the affected environment and the environmental consequences of the alternatives.

Grizzly Bears

Grizzly bears in the NCE are isolated from other grizzly bear populations. The nearest populations to the east are in the Kettle-Granby Grizzly Bear Population Unit (GBPU) in British Columbia and the Selkirk Mountains in Washington, Idaho, and British Columbia. Grizzly bears inhabit the remote areas east of the Okanogan River and west of the Kettle-Granby Mountains, but the very limited number of detections indicate that the populations are probably limited to a very small number of animals. The nearest population to the north is composed of a small number of individuals in the Stein-Nahatlatch GBPU in British Columbia (Proctor et al. 2012). Farther to the west, grizzly bears in the Squamish-Lillooet and Garibaldi-Pitt GBPUs are likewise not at a population density that would facilitate range expansion into the NCE through dispersal across the major barriers created by the Fraser River, the TransCanada Highway, two national railroads, and the high levels of human influence along that corridor (Braaten et al. 2013). Few confirmed sightings of grizzly bears have been made in recent decades in the NCE on either side of the international border. The most recent confirmed observation within the U.S. portion of the NCE was in 1996, south of Glacier Peak. The only direct evidence of reproduction during the past 25 years was a confirmed observation of a female and cub on upper Lake Chelan in 1991. Because of the small size and isolation of the NCE grizzly bear population, it is believed to be at significant risk of eventual extirpation. Biological consensus is that grizzly bears in the NCE would have difficulty recovering on their own and need some form of human intervention to achieve reproduction and eventual recovery.

Under alternative A (no-action alternative), it is unlikely that the restoration goal of 200 grizzly bears in the NCE would be achieved because grizzly bears in the NCE would have difficulty recovering on their own and would require some form of human intervention to achieve reproduction and eventual recovery.

Under alternative B (ecosystem evaluation restoration), grizzly bears released into the NCE would benefit in the long term from a large block of suitable habitat that would help further the conservation of the species. Alternative B could promote the highest survival rate of translocated bears of all the action alternatives through its monitoring and adaptive management plan, but the slower rate of releases would likely increase the amount of time to achieve the restoration goal in the NCE. The release of grizzly bears into the NCE would require their capture and transport from other areas, and some level of mortality is

expected. However, every effort would be taken to minimize capture and transport-related mortalities. The North Cascades Grizzly Bear Recovery Team (British Columbia 2004) estimates that approximately 2% of the grizzly bear population in the NCE would be lost to human-caused mortality each year, including mortalities associated with restoration activities. Although the removal of grizzly bears from source populations in Montana and British Columbia would effectively count as mortality, the sustainability of these source populations would not be affected. Overall, alternative B would result in beneficial impacts on grizzly bears by initiating their restoration to areas of suitable habitat and furthering conservation of the species. Cumulative impacts on grizzly bears under alternative B would be beneficial, and the contribution of alternative B to overall beneficial cumulative impacts would be small, limited by the small number of bears released.

Alternative C (incremental restoration) would release up to 5 to 7 grizzly bears per year until an initial population of 25 grizzly bears in the U.S. portion of the NCE is reached, although additional bears could be released every few years to help meet restoration objectives. Once an initial population of 25 grizzly bears is reached, the restoration goal of 200 bears in the NCE would likely be achieved in approximately 60 to 100 years. Similar to alternative B, the handling of grizzly bears translocated to the NCE during capture, release, and monitoring would result in a minimal risk of human-caused mortality and the sustainability of source populations in Montana and British Columbia would be minimally affected. Overall, alternative C would result in beneficial impacts on grizzly bears by restoring them to areas of suitable habitat and furthering conservation of the species. Cumulative impacts on grizzly bears under alternative C would be beneficial, and the contribution of alternative C to overall beneficial cumulative impacts would be substantial.

Alternative D (expedited restoration) would involve the release of grizzly bears into the NCE until the restoration goal is achieved, which would require the translocation of 155 to 168 grizzly bears. In addition, the greater level of trapping effort required by alternative D would increase the risk of adverse impacts on grizzly bears from capture-related mortality. It would take approximately 25 years to reach 200 bears in the NCE using the expedited restoration strategy and assuming a certain amount of reproduction. Alternative D is not likely to have any substantial adverse impacts on the resident population of grizzly bears in source areas because the managing agencies in these areas would determine the appropriate number of grizzly bears available for translocation. Similar to alternative C, alternative D would result in beneficial impacts on grizzly bears by restoring them to areas of suitable habitat and furthering conservation of the species. Cumulative impacts on grizzly bears under alternative D would be beneficial, and the contribution of alternative D to overall beneficial cumulative impacts would be substantial.

Other Wildlife and Fish

The NCE is home to a high diversity of other wildlife, birds, and fish that have adapted to a range of diverse habitats. Grizzly bear restoration actions could affect species as a result of the use of aircraft or other vehicles during the release and monitoring of grizzly bears. Wildlife and fish species such as elk and deer, black bear, and trout could be affected in terms of grizzly bear predation or competition for resources.

Under alternative A, the no-action alternative, no grizzly bears would be released into the NCE; therefore, there would be no predator-prey interactions or competition for resources between grizzly bears and other wildlife species.

Under alternative B, the initial release of grizzly bears into the NCE could result in disturbance to denning mammals or nesting birds as a result of helicopter operations in close proximity to active dens or nests; however, this disturbance is expected to be limited to approximately four flights per bear and would be

limited to five to seven days per year in mid- to late summer and fall. There would be an increased incidence of grizzly predation on ungulates, which would be low given the initial number of bears released. Potential adverse impacts on black bear population dynamics from interspecific competition is expected to be limited to interactions between individual bears and would not be expected to affect black bears on a population level. Initial restoration activities under alternative B would not involve any disturbance of fish habitat. Fish are not expected to be a primary food source for grizzly bears, and the number of grizzly bears in the ecosystem would not be sufficient to generate any adverse impacts on fish populations as a result of predation. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse effects on other wildlife species, but in aggregate, these impacts would be beneficial. Alternative B would contribute adverse impacts primarily related to helicopter use during initial restoration, but overall would contribute to beneficial cumulative impacts.

Alternative C would result in impacts on predator-prey interaction similar to those described under alternative B. These would be more pronounced under alternative C during the early part of the grizzly bear restoration process. Under alternative C, approximately 2.5 times more helicopter flights would occur than under alternative B, but the anticipated impacts on other wildlife species from noise associated with helicopter use would be similar. Ongoing and reasonably foreseeable future activities would have both beneficial and adverse on other wildlife species under alternative C, but in aggregate, these impacts would be beneficial. Alternative C would contribute some adverse impacts on other wildlife species primarily related to helicopter use, but overall would contribute to beneficial cumulative effects on other wildlife.

Under alternative D, the release of grizzly bears into the NCE would take place until the restoration goal is achieved. As a result, it would occur over a much shorter period of time than under alternative C (approximately 25 years). However, the number of helicopter operations in a given season is expected to be roughly the same under all alternatives; therefore, the potential for adverse impacts on other wildlife in a given year is expected to be similar to alternative C. Alternative D would result in adverse impacts related to the potential for grizzly bear predation on, and/or competition with, some wildlife and fish species, and these would be detectable much more quickly than under alternative C because of the shorter time frame to reach the restoration goal. Given the habitat use, life histories, and other characteristics of many of these species, in combination with grizzly bear life history, habitat use, feeding behavior, and the expected number of grizzly bears that would be present in the NCE in the long term, adverse impacts on other wildlife species are nonetheless expected to be minimal. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on other wildlife species, but in aggregate, these impacts would be beneficial. Alternative D would contribute adverse impacts primarily related to helicopter use but would have no lasting adverse impacts. The reestablishment of grizzly bears as part of the ecosystem would result in improved ecosystem health over the long term. Overall, cumulative impacts on other wildlife and fish under alternative D would be beneficial, and alternative D would contribute a beneficial increment to these overall beneficial cumulative impacts.

Wilderness Character

The North Cascades National Park Service Complex (park complex), adjacent national forest wilderness areas, and other national forest wilderness not contiguous with the park complex comprise more than 2.6 million acres of federally designated wilderness within the NCE. Federally designated wilderness is typically characterized in terms of five different wilderness character qualities: untrammeled, natural, undeveloped, providing opportunities for solitude or primitive and unconfined recreation, and other features of value. All of these wilderness qualities are reasonably intact within the NCE. Grizzly bear restoration activities could affect wilderness character and values in both adverse and beneficial ways.

Under alternative A, the no-action alternative, grizzly bears would not be released into the NCE, resulting in no new impacts on the undeveloped quality of wilderness character.

The implementation of alternative B would result in adverse and beneficial impacts on wilderness character. This alternative would release up to 10 grizzly bears over the first 2 years of initial restoration activities. The duration of impacts on the qualities of wilderness character would likely be short, only occurring during releases, limited by the number of helicopter trips over the first, 2 years (approximately 40 trips). There would also be intermittent and localized adverse impacts from monitoring grizzly bears or additional translocations of grizzly bears to address issues with mortality, population trends, genetic limitations, distribution, or the sex ratio. However, the restoration of grizzly bears would benefit the natural value of wilderness because the species is largely absent from the NCE with only a few sightings in the last 10 years. When combined with other past, present, and reasonably foreseeable future actions, the cumulative actions of alternative B would result in adverse impacts on wilderness character as a result of the methods used for restoration, and the adverse contribution of alternative B to these cumulative actions would be minimal. However, the limited adverse impacts from alternative B would be offset by restoring a native species, a beneficial impact.

Alternative C would result in impacts on wilderness character in the NCE similar to those described for alternative B, but these impacts could be experienced over a longer time frame because alternative C would involve the release of 25 bears over approximately 5–10 years, with up to 100 to 136 helicopter flights to release 25 to 34 bears (up to 9 bears released to address mortality or emigration). Over time, the restoration of the grizzly bear would result in benefits to the natural quality of wilderness because it would restore a native species to the ecosystem. Cumulative actions would result in adverse impacts on wilderness character, but the adverse contribution of alternative C to these cumulative actions would be minimal. Alternative C would also provide lasting benefits to wilderness by restoring a native species.

The implementation of alternative D would result in adverse impacts associated with the active capture and release of grizzly bears into the NCE similar to those described under alternative C; however, adverse impacts would continue for up to 15 additional years (including 672 helicopter flights), substantially extending the impacts on wilderness character over time. Release of grizzly bears would result in lasting beneficial impacts on wilderness character by restoring a native species that has not had a viable population in the NCE in many years. Overall, cumulative actions would result in adverse impacts on wilderness character, and the adverse contribution of alternative D to these overall adverse cumulative impacts would be minimal.

Visitor Use and Recreational Experience

The park complex and the national forests within the NCE provide a diverse array of recreational opportunities, including hiking, backpacking, camping, climbing, fishing, horseback riding, bicycling, boating, winter sports, and wildlife viewing. Opportunities for hunting are available in the NPS national recreation areas and on the national forests, and off-road vehicle use is permitted on the national forests. The park complex offers a variety of educational and interpretive programs, visitor facilities, and lodging facilities. The restoration of grizzly bears to the NCE could increase visitation and recreational use of the park and national forests as visitors seek to experience grizzly bears in their native habitat. Restoration actions that result in an increased grizzly bear population could also affect recreational opportunities for visitors who do not wish to encounter grizzly bears.

Under alternative A, the no-action alternative, grizzly bear restoration activities would not occur in the NCE and as a result, no impacts on visitor use and recreational experience are expected.

Overall, the impacts of alternative B on visitor use and recreational experience would be varied but limited given the small number of bears released into the ecosystem and the limited number of helicopter trips over 2 years (approximately 40 trips). The potential for conflicts to occur is expected to remain low because the number and density of grizzly bears on the landscape would remain very small, (approximately 10 bears), limiting the probability that visitors would encounter them. Additionally, the location of the release site in high quality grizzly habitat away from main visitor areas would mitigate the potential for human-grizzly interactions. Adverse impacts associated with intermittent, brief disruptions to visitor use that may be associated with certain activities (e.g., 40 helicopter flights) would be offset by the benefits of grizzly bears being restored to a native ecosystem. Because road and trail access would not be restricted, no change from the existing condition is expected. Cumulative impacts resulting from other management actions (repair and maintenance of trails and infrastructure, removal of invasive species, and habitat restoration projects) would be an improvement to existing conditions and would combine with alternative B to provide overall benefits.

Under alternative C, the primary phase of grizzly bear restoration would be spaced out over 5 to 10 years, with up to 100 to 136 helicopter flights into remote areas to release 25 to 34 bears (up to 9 bears released to address mortality or emigration), although some additional flights may also be necessary for collar retrieval, subsequent releases, and incidental actions. These flights could temporarily disrupt visor use and recreational experiences if visitors are in the flight path or in areas of releases to a greater extent under alternative C than under alternative B. These impacts would be very short, lasting only minutes per occurrence. Other adverse impacts could occur if restoration activities require temporary closures; however, based on experience in other ecosystems, closures are only expected to last a few hours up to a couple of days. The potential for conflicts to occur is expected to remain low because the number and density of grizzly bears on the landscape would remain small, limiting the probability that visitors would encounter them and because full restoration would take between 60 and 100 years. Visitor perceptions and impacts would be the similar to those described under alternative B. Alternative C would provide lasting benefits regarding visitors' experience of nature through the reestablishment of a native species that has not had a viable population in the NCE for many years. When combined with other past, present, and reasonably foreseeable future actions, cumulative impacts from alternative C are expected to be primarily beneficial, with alternative C contributing some adverse, but otherwise beneficial impacts.

Alternative D has the potential for more impacts on visitor use and recreational experience compared to the other alternatives because it would involve the release of more grizzly bears, and active capture and release operations would take place over a longer time frame. Alternative D would have more pronounced effects (during the primary phase) on visitor use and recreational experience related to management activities, noise, and the visible presence of helicopters (672 flights) and aircraft as well as the potential for human-grizzly encounters when compared to the other alternatives. Alternative D involves the additional releases of bears; therefore, the potential for human-grizzly bear interaction is somewhat greater within a shorter time frame compared to alternatives B and C. However, alternative D would provide lasting benefits regarding visitors' experience of nature through the reestablishment of a native species that has not had a viable population in the NCE for many years. When combined with other past, present, and reasonably foreseeable future actions, cumulative impacts from alternative D are expected to be primarily beneficial, with alternative D contributing some adverse, but otherwise beneficial impacts.

Public and Employee Safety

Negative interactions between humans and grizzly bears, while rare, do occur. Every situation is dynamic, and a grizzly bear's reaction depends on a variety of factors, including the proximity between a bear and a human, the type of encounter (i.e., whether the bear is behaving in a defensive or offensive manner), and whether cubs or a valuable food resource are involved, among other considerations. The restoration of grizzly bears in the NCE has raised concerns about safety risks to backcountry recreational visitors and

residents of the NCE because of the potential for negative grizzly bear interactions. In addition, the capture, release, and monitoring of grizzly bears could affect employee safety given the dangerous nature of the activity.

Under the no-action alternative, the continuation of management activities in grizzly bear habitat would result in beneficial impacts on public safety as a result of safety, sanitation, and public outreach efforts and minimal, long-term, adverse impacts on employee safety as a result of the potential for employee injury during monitoring or conflict grizzly bear response activities. The likely eventual loss of grizzly bears in the NCE would eliminate the possibility of any negative human-grizzly bear interactions.

Alternative B could result in adverse impacts on employee safety given the inherent risk of injury during restoration activities, related to helicopter operations and capture and release activities associated with grizzly bears. The probability of these adverse impacts occurring would diminish over time as employees become more experienced in the activity. Periodic hazing, relocation, or removal of conflict grizzly bears would also result in adverse impacts on employee safety.

Alternative B would result in adverse impacts on public safety as a result of the increased potential, albeit very low, for human-grizzly bear conflicts because of the increased number of grizzly bears in the ecosystem. The implementation of safety, sanitation, and public outreach efforts, and conflict grizzly bear management would further mitigate the potential for adverse impacts resulting from human-grizzly bear conflicts. Present and reasonably foreseeable future actions would contribute both beneficial and adverse impacts. Overall, cumulative effects on public and employee safety under alternative B would be adverse and beneficial with alternative B contributing a slight adverse increment.

Alternative C could result in adverse impacts on employee safety related to helicopter operations and capture and release activities associated with grizzly bear restoration. The probability of these adverse impacts occurring would diminish in the long term as initial restoration efforts that release multiple grizzly bears into the NCE each season give way to more intermittent additional releases as necessary. Under alternative C, restoration activities in grizzly bear habitat would result in adverse impacts on public safety in both the primary and adaptive management phases because of the slightly increased potential for human-grizzly bear conflicts from the increased number of grizzly bears in the ecosystem. The potential for conflicts to occur is nonetheless expected to remain relatively low because the low number and density of grizzly bears on the landscape would limit the probability that visitors would encounter grizzly bears. Present and reasonably foreseeable future actions, as analyzed above, would contribute beneficial and adverse impacts, but in aggregate these impacts would be beneficial. Overall, cumulative effects on public and employee safety under alternative C would be long-term and beneficial, with alternative C contributing a slight adverse increment to the overall beneficial cumulative impact.

Alternative D could result in similar types of adverse impacts on employee safety to those described under alternative C; however, given the much larger number of bears handled, the potential for impacts would be much larger. The probability of these adverse impacts occurring would diminish over time and would be limited to relocation and removal of conflict grizzly bears because no additional releases would occur once the restoration goal of 200 grizzly bears is achieved. Under alternative D, restoration activities in grizzly bear habitat could result in long-term, adverse impacts on visitor safety as a result of the increased potential for human-grizzly bear conflicts because of the increased number of grizzly bears in the ecosystem. The potential for conflicts to occur would be greater during the primary phase of alternative D than under alternative C because of the greater intensity of initial restoration efforts and the shorter time frame for achieving the restoration goal of 200 grizzly bears. Present and reasonably foreseeable future actions, as analyzed above, would contribute beneficial and adverse impacts, but in aggregate, the impacts would be beneficial. Overall, cumulative effects on public and employee safety

under alternative D would be beneficial, with alternative D contributing a slight adverse increment to the overall beneficial cumulative impact.

Socioeconomics

The NCE consists of an expansive and largely undeveloped wildland area that spans the crest of the Cascade Range, extending from the more populated, industrialized, urban areas of the Puget Sound region to the more rural, agricultural, and natural resource-based economies of the Okanogan Highlands and Columbia Plateau. The restoration of grizzly bears in the NCE has raised concerns about economic impacts on natural resource-based industries such as mining and logging. Impacts related to depredation of livestock or agriculture, such as fruit orchards, could also result. In addition, grizzly bear restoration could affect revenue to local businesses from changes in tourism.

Under the no-action alternative, no socioeconomic impacts would occur because grizzly bears would not be restored into the NCE.

Alternative B would contribute both adverse and beneficial, albeit negligible, impacts on employment, communities, agriculture, cattle grazing, tourism, timber harvesting, and mining as the result of the release of 10 grizzly bears into the NCE over 2 years. More NPS, FWS, and USFS staff would be required during the primary phase to implement the project and educate the public. Tourism could be beneficially affected because grizzly bears may draw more tourists to the area; however, it could also be negatively affected because some areas may be temporarily and intermittently closed to tourists or some visitors may choose to avoid the NCE because of the presence of grizzly bears. Agriculture and livestock grazing would be unlikely to be affected during the primary phase given the small number of bears that would be released under this alternative, relative distance that these operations are located from potential grizzly bear release sites, and the potential for depredation compensation. Impacts on timber harvests and mining operations would be intermittent because of the small number of bears present relative to the total amount and location of these types of operations. Present and reasonably foreseeable future actions would contribute both beneficial and adverse impacts, as analyzed above. Cumulative effects on socioeconomics under alternative B would be beneficial overall, with alternative B likely contributing very limited adverse impacts based on the small number of bears released into the NCE, though it could provide some benefits related to tourism.

Under alternative C, impacts would be similar but incrementally greater than those impacts described under alternative B. More NPS, FWS, and USFS staff would be required during both the primary phase and adaptive management phase to implement restoration. Tourism could be beneficially affected because grizzly bears could draw more tourists to the area; it could also be negatively affected because some additional areas may be closed to tourists on an intermittent and temporary basis. Agriculture and livestock grazing would be more likely to be affected because more bears would be released under this alternative; however, given depredation compensation programs and the relative distance that these operations are located from potential grizzly bear release sites, these impacts are still anticipated to result in few if any adverse impacts. Impacts on timber harvests and mining operations would still be intermittent and short term because of the small number of bears present relative to the total amount and location of these types of operations. Present and reasonably foreseeable future actions would contribute beneficial and adverse impacts, as analyzed above. However, overall, cumulative effects on socioeconomics under alternative C would be negligible, with alternative C contributing some adverse impacts on socioeconomic resources, although benefits, especially to tourism, are also expected as some additional visitors may come to the NCE to see grizzly bears.

Under alternative D, more NPS, FWS, and USFS staff would be required during the primary phase to implement the project and educate the public compared to alternative C. Tourism could be more

beneficially affected under this alternative because a greater number of grizzly bears in a shorter period (25 years) may draw more tourists to the area. However, the increased presence of bears could slightly negatively impact some tourists because some additional areas may be temporarily and intermittently closed to during the primary phase. Agriculture and livestock grazing would be more likely to be affected during the primary phase because more bears would be released; however, given the relative distance that these operations are located from potential grizzly bear release sites and the potential for depredation compensation, these impacts are still anticipated to result in few if any adverse impacts. Impacts on timber harvests and mining operations would be similar to those described under alternative C. Present and reasonably foreseeable future actions would contribute beneficial and adverse impacts. Overall, cumulative actions would result in both adverse and beneficial impacts on employment, income, and sales. Alternative D would contribute the same impacts as described above under alternative C, although many impacts on socioeconomic resources would likely occur earlier because of the accelerated rate at which the restoration goal (200 bears) would be achieved.

Ethnographic Resources

Ethnographic resources are landscapes, objects, plants and animals, or sites and structures that are important to a people's sense of purpose or way of life. Ethnographic resources have special importance for specific groups of people different from the general public. The grizzly bear is an important part of tribal culture and history in the Northwest. The decline or restoration of grizzly bears in the NCE would be likely to affect ethnographic resources in various ways.

Under alternative A, the no-action alternative, grizzly bears would not repopulate the NCE, and no actions would be taken to relocate grizzly bears to the ecosystem, leading to permanent, adverse impacts on ethnographic resources in terms of the absence of a species that is itself an ethnographic resource. No potential adverse impacts are expected on other ethnographic resources related to traditional hunting and gathering because no bears would be released.

Under alternative B, the initiation of grizzly bear restoration would result in the restoration of an ethnographic resource largely absent from the NCE. Alternative B would result in benefits on ethnographic resources, but the rate of these benefits would take longer to fully achieve, based on the small number of bears released under alternative B. Adverse impacts on other ethnographic resources could occur because of the potential for reduced access during the proposed management activities associated with the release of grizzly bears. However, bears would be released in one remote location with consideration of tribal access to that site, and those areas would be avoided to the extent possible. The benefits of the alternative would contribute to the beneficial impacts from other projects and result in overall beneficial cumulative effects by ensuring that grizzly bears continue to be present in the NCE. Overall, the benefits provided by alternative B would likely offset any minimal, adverse impacts on ethnographic resources that may occur.

Alternative C would have long-term benefits on ethnographic resources by ensuring the continuation of the presence of the grizzly bear—an important ethnographic resource within the NCE; however, it would take many years for the full benefits to be achieved. Some adverse impacts on other ethnographic resources could occur because of reduced access during the management activities associated with the release of grizzly bears. However, the agencies would take steps to reduce the potential conflict with tribal use of areas. Avoidance of tribal use areas during release site identification would help reduce potential adverse impacts. The overall benefits of restoring grizzly bears would contribute to the beneficial impacts from other projects and result in beneficial cumulative effects. Overall, alternative C would largely result in beneficial impacts by restoring an ethnographic resource and would seek to limit adverse impacts associated with access limitations.

Under alternative D, impacts on ethnographic resources would be long term and beneficial as a result of the restoration of the grizzly bear population within the NCE. These beneficial impacts would be achieved within the lifetime of some tribal members—a faster rate than under other alternatives. Some adverse impacts on other ethnographic resources could occur because of access limitations during the proposed release of grizzly bears. As described above, efforts would be made to avoid areas of tribal use to the extent possible to help avoid access restrictions. Given the number of bears released and the years of active restoration activity, the likelihood that access restrictions could affect tribal use areas is highest compared to the other action alternatives. Alternative D would contribute to the beneficial impacts from other projects and result in beneficial cumulative effects by ensuring that grizzly bears continue to be present. Overall, alternative D would benefit ethnographic resources similar to alternative C, although it would achieve restoration at a faster rate. However, alternative D has a higher chance of adverse impacts related to access restrictions during the initial phase of restoration. Overall cumulative effects on ethnographic resources would be beneficial, and alternative D would contribute a beneficial increment to these cumulative impacts.

Areas outside the NCE

In the event that the option to designate the NCE population of grizzly bears as a section 10(j) experimental population is selected, additional management measures may become available to managers to use non-lethal measures to reduce impacts on grizzly bears that move outside NCE or to mitigate human-grizzly bear conflicts. Bears that move outside of what is considered suitable habitat would be recaptured and moved back to the NCE if at all possible. Based on existing 4(d) rules, managers and landowners could take actions to mitigate human-grizzly bear conflicts, including using hazing and killing bears. These types of actions could reduce the bear population; however, the expected likelihood of these impacts is low based on the low likelihood of bears moving out of the NCE. It is expected that any mortality associated with bears moving outside the NCE would be 2%–4% of the restored population. The implementation of a 10(j) designation could help mitigate impacts on visitor use and recreational use, public and employee safety, and socioeconomics, while helping to ensure a restored grizzly bear population in the NCE.

SCOPING PROCESS AND PUBLIC PARTICIPATION

Regulations implementing NEPA require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 Code of Federal Regulations [CFR] § 1501.7). To determine the scope of issues to be analyzed in depth in this draft plan/EIS, the NPS and FWS conducted internal and agency scoping and formal public scoping. The NPS and FWS used the scoping process to inform the development of alternatives and to identify the issues and impact topics carried forward for analysis in this draft plan/EIS.

On October 1, 2014, the NPS and FWS invited the USFS and Washington Department of Fish and Wildlife (WDFW) to participate as cooperating agencies in the development of this draft plan/EIS. A two-day internal scoping meeting was held on October 21 and 22, 2014, to discuss the development of a grizzly bear restoration draft plan/EIS for the NCE. During the meeting, NPS, FWS, USFS, and WDFW identified the purpose of and need for action, management objectives, issues, and impact topics, and preliminary alternative approaches. They also discussed cooperating agency roles and involvement and the public scoping process.

The public scoping period for this draft plan/EIS began on February 19, 2015, with publication of the Notice of Intent in the *Federal Register* (Volume 80, Number. 33) and continued until March 26, 2015. Six public scoping open houses were held during the scoping period, in Winthrop, Okanogan, Wenatchee,

Cle Elum, Seattle, and Bellingham, Washington. During the scoping period, 2,881 pieces of correspondence were received. Following the public scoping period, the NPS reviewed all public comments and developed a Comment Analysis Report to compile and correlate similar public comments into a format useable by decision-makers and the planning team. The Comment Analysis Report provides assistance in organizing, clarifying, and addressing technical information pursuant to NEPA regulations and in identifying the topics and issues to be evaluated and considered throughout the planning process.

Upon publication of the notice of availability of the draft plan/EIS in the *Federal Register*, a news release was provided to the media outlets who received the news release announcing the Notice of Intent in February 2015. Notice of publication of the draft plan/EIS was provided to media, interested individuals, and organizations via the NPS and FWS standard mailing /distribution lists and other means. The draft plan/EIS will be subject to a public review and comment period lasting 60 days, after which time all comments received will be reviewed and analyzed for incorporation into the final plan/EIS.

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ACRONYMS

AUM	animal unit month
BE	Bitterroot Ecosystem
BMU	Bear Management Unit
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CYE	Cabinet-Yaak Ecosystem
dBA	A-weighted decibel
draft plan/EIS	*North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement*
EIS	environmental impact statement
ESA	Endangered Species Act
FR	*Federal Register*
FWS	U.S. Fish and Wildlife Service
GBPU	grizzly bear population unit
GIS	geographic information system
GMP	general management plan
GPS	global positioning system
GYE	Greater Yellowstone Ecosystem
IGBC	Interagency Grizzly Bear Committee
MOU	Memorandum of Understanding
mph	miles per hour
NCDE	Northern Continental Divide Ecosystem
NCE	North Cascades Ecosystem
NEPA	*National Environmental Policy Act*
NPS	National Park Service
park complex	North Cascades National Park Service Complex
ROI	region of influence
SE	Selkirk Ecosystem
USFS	U.S. Forest Service
WDFW	Washington Department of Fish and Wildlife

Chapter 1:

PURPOSE OF AND NEED FOR ACTION

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

The grizzly bear (*Ursus arctos horribilis*) was listed as threatened under the *Endangered Species Act* (ESA) on July 28, 1975. Following the listing, the U.S. Fish and Wildlife Service (FWS) initiated a recovery effort directed at establishing viable populations in portions of four states where the grizzly bear was known or believed to exist at the time of listing. The remaining grizzly bears in the western United States are managed within six recovery zones: the Greater Yellowstone Ecosystem (GYE) grizzly bear recovery zone in Wyoming and southwest Montana; the Northern Continental Divide Ecosystem (NCDE) grizzly bear recovery zone in northwest Montana; the Cabinet-Yaak Ecosystem (CYE) grizzly bear recovery zone, which includes extreme northwestern Montana and the northern Idaho panhandle; the Selkirk Ecosystem (SE) grizzly bear recovery zone of northern Idaho and northeastern Washington; the Bitterroot Ecosystem (BE) grizzly bear recovery zone in central Idaho and western Montana; and the North Cascades Ecosystem (NCE) grizzly bear recovery zone of northwestern and north-central Washington (FWS 1993a).

The North Cascades Ecosystem grizzly bear recovery zone comprises one of the most intact wildlands in the contiguous United States (Servheen et al. 1991).

The greater NCE, including its Canadian and U.S. portions, is bounded roughly by the Fraser River on the north, the Okanogan Highlands and Columbia Plateau on the east, Snoqualmie Pass to the south, and the Puget lowlands to the west. Combined, the U.S. and Canadian portions of the greater NCE constitute a large block of contiguous habitat that spans the international border but is isolated from grizzly bear populations in other parts of the two countries. The NCE grizzly bear recovery zone as delineated by the U.S. portion of the ecosystem is hereafter referred to as the NCE, and comprises one of the most intact wildlands in the contiguous United States (figure 1) (Servheen et al. 1991).

The NCE spans the crest of the Cascade Range from the temperate rainforests of the west side to the dry ponderosa pine forests and sage-steppe on the east side. This landscape spans over 10,000 feet of vertical relief, resulting in a high level of variation in climate and topography and a high diversity of species adapted to a wide spectrum of habitats. The area includes extensive tracts of low elevation old growth forest, subalpine meadows, and alpine environments (NPS 2012a). The overall population status of the grizzly bear in the greater NCE is unknown; however, it is highly unlikely that the NCE contains a viable grizzly bear population. Only four detections of grizzly bears have been confirmed in the greater NCE in the past 10 years, all of which occurred in British Columbia and may comprise only 2 individuals (IGBC NCE Subcommittee 2016). Because of the small documented number of grizzly bears, very slow reproductive rate, and other recovery constraints, the grizzly bear in the NCE was found by the FWS to be warranted for uplisting to endangered status, but was precluded by higher-priority listings (FWS 2016a). Given there has been no confirmed evidence of grizzly bears within the NCE in the United States since 1996, (IGBC NCE Subcommittee 2016) any remaining bears in the NCE do not meet the accepted definition for a population (i.e., evidence of 2 adult females with cubs or 1 adult female tracked through two litters) (FWS 2000a).

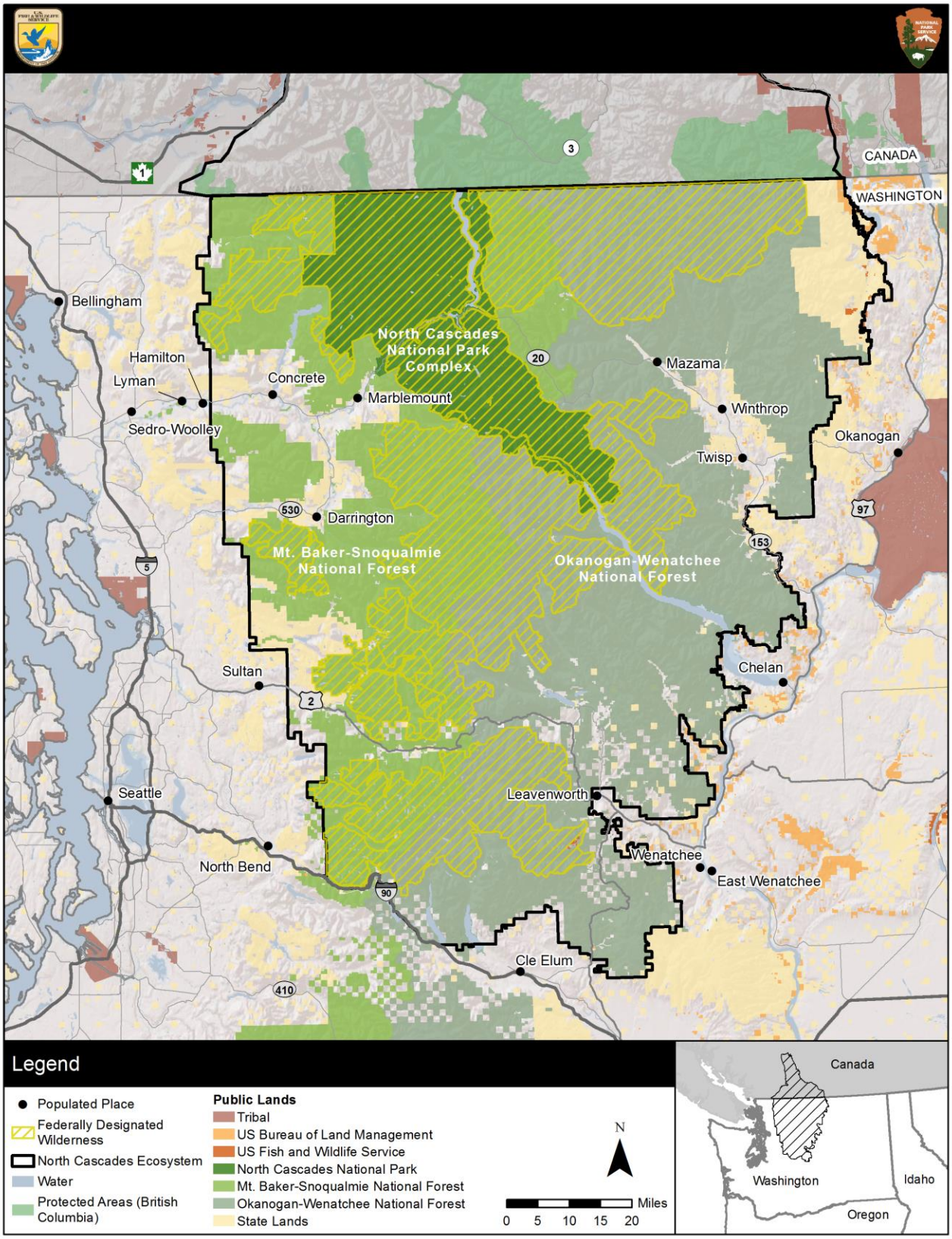

FIGURE 1. AREA OF ANALYSIS

This *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (draft plan/EIS) evaluates the effects of alternatives for grizzly bear restoration, including potential impacts on wildlife and fish (including grizzly bears), wilderness, visitor use and recreational experience, socioeconomics, public and employee safety, and ethnographic resources. Upon conclusion of the *National Environmental Policy Act* (NEPA) process, an alternative, or a combination of actions described under multiple alternatives, will be selected in a record of decision.

PURPOSE OF AND NEED FOR ACTION

Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1502.13) require that the federal agency responsible for preparing an environmental impact statement (EIS) provide a brief description of its purpose and need. The U.S. Department of the Interior's regulations for implementing NEPA define purpose and need as follows:

- Purpose may refer to the goal or objective that the agency is trying to achieve and should be stated in terms of the desired outcome, to the extent possible (43 CFR 46.420(a)).
- The need for action may be described as the underlying problem or opportunity to which the agency is responding with the action (43 CFR 46.420(a)).

Purpose of the Plan / Environmental Impact Statement

The purpose of this draft plan/EIS is to determine how to restore the grizzly bear to the NCE, a portion of its historical range.

Need for Action

Because the NCE grizzly bears are at risk of local extinction, action is needed at this time to:

- Avoid the permanent loss of grizzly bears in the NCE.
- Contribute to the restoration of biodiversity of the ecosystem for the benefit and enjoyment of present and future generations of people.
- Enhance the probability of long-term survival of grizzly bears in the NCE and thereby contribute to overall grizzly bear recovery.
- Support the recovery of the grizzly bear to the point where it can be removed from the federal list of threatened and endangered wildlife species.

Objectives in Taking Action

Objectives are more specific statements of purpose that provide additional bases for comparing the effectiveness of alternatives in achieving the desired outcomes of an action (NPS 2015a). The objectives of this draft plan/EIS are to

- Restore a grizzly bear population as part of the natural and cultural heritage of the North Cascades.
- Provide Pacific Northwest residents and visitors with the opportunity to again experience grizzly bears in their native habitat.

- Seek to support tribal cultural and spiritual values, as well as environmental and natural resource objectives related to the grizzly bear.
- Expand outreach efforts to inform and involve the public, and build understanding about grizzly bear recovery.

DESCRIPTION OF THE AREA OF ANALYSIS

The following section provides a description of the area of analysis for this draft plan/EIS (see figure 1) and an overview of its resources. Figure 1 depicts the distribution of the various U.S. federal lands that comprise much of the area within the NCE grizzly bear recovery zone.

The area of analysis for this draft plan/EIS is the NCE grizzly bear recovery zone, which is comparable in size to the state of Vermont, encompassing approximately 9,800 square miles, or 6.1 million acres, within the state of Washington (FWS 1997).

The area of analysis for this draft plan/EIS is centered on the NCE grizzly bear recovery zone but extends to those areas outside the NCE where grizzly bears may go in the future. All restoration actions would occur in the NCE recovery zone. The NCE covers portions of Chelan, King, Kittitas, Okanogan, Skagit, Snohomish, and Whatcom counties in Washington State. If grizzly bears do move outside the NCE in the future, they would likely be first observed in the non-NCE portions these counties. If bears were to move beyond this area, the range of effects from grizzly bear restoration would be similar to the effects that may be experienced in the counties that comprise the NCE.

The NCE is comparable in size to the state of Vermont, encompassing approximately 9,800 square miles, or 6.1 million acres, within the state of Washington (FWS 1997). Situated in the core of the area of analysis is the 682,000-acre North Cascades National Park Service Complex (park complex). The park complex includes North Cascades National Park and Ross Lake and Lake Chelan National Recreation Areas, and makes up approximately 11% of the NCE grizzly bear recovery zone. The 641,084-acre Stephen Mather Wilderness comprises approximately 94% of the park complex. The park complex is bounded on the east, west, and south by national forest lands. These lands consist of most of the Mt. Baker-Snoqualmie and Okanogan-Wenatchee National Forests, including nearly 2 million acres of wilderness, and make up roughly 74% of the NCE grizzly bear recovery zone. Approximately 5% of the NCE grizzly bear recovery zone is made up of state lands, and 10% is made up of private lands (FWS 1997).

Combined, the park complex and national forest wilderness areas within the NCE comprise over 2.6 million acres of federally designated wilderness. Adjoining the NCE grizzly bear recovery zone to the north are protected lands in British Columbia, Canada, including approximately 442,300 acres of provincial park land within the Canadian portion of the NCE. By virtue of sheer size and protected status, this international wilderness ecosystem is one of the few places where wolves, wolverines, lynx, and other carnivores still roam. Research indicates it is capable of supporting a self-sustaining grizzly bear population (Lyons et al. 2016; Servheen et al. 1991; Almack et al. 1993).

BACKGROUND

The following section includes background information on grizzly bears in the western United States, a discussion of background information and management concerns related to grizzly bears in the NCE, and a summary of the status of grizzly bear recovery in other ecosystems.

Grizzly Bears in the Western United States

The grizzly bear has a broad range of habitat tolerance and once existed throughout western North America and northern Mexico. Contiguous, relatively undisturbed, mountainous habitat with a high level of topographic and vegetative diversity characterizes most of the areas where populations of grizzly bears remain. The Lewis and Clark Expedition first encountered grizzly bears in the northern Great Plains after departing St. Louis, Missouri, in 1804. The estimated 19th-century population of 50,000 grizzly bears was reduced to fewer than 500 by the 1930s. Today, only five populations survive in the contiguous United States (FWS 1993a), totaling approximately 1,850 grizzly bears (Servheen pers. comm. 2015). Because of the continuing decline of the species, the grizzly bear was listed as threatened under the ESA in 1975. Direct killing, habitat destruction, habitat modification, and range curtailment were identified by the FWS as major contributing factors that led to the decline of the species (FWS 1993a).

Grizzly Bears in the North Cascades Ecosystem

Last photographed grizzly bear from the U.S. portion of the NCE (1967)

Historical records indicate that grizzly bears once occurred throughout the NCE grizzly bear recovery zone (Bjorkland 1980; Sullivan 1983; Almack et al. 1993). A grizzly bear habitat evaluation of the NCE was conducted from 1986 to 1991 (Almack et al. 1993; Gaines et al. 1994) in response to recommendations made in the 1982 FWS nationwide *Grizzly Bear Recovery Plan*, discussed below. This habitat evaluation and a report by the Interagency Grizzly Bear Committee (IGBC) NCE Subcommittee (Servheen et al. 1991) conclude that the U.S. portion of the NCE contains sufficient habitat quality to maintain and recover a grizzly bear population, and FWS added a chapter specifically regarding the NCE to the nationwide *Grizzly Bear Recovery Plan*. In this chapter, the FWS estimates that a grizzly bear population would be considered viable within the NCE when monitoring indicates that the population is self-sustaining and large enough to offset some amount of human-induced mortality, and reproducing female grizzly bears are distributed throughout the recovery area (FWS 1997). Based on a qualitative assessment by the IGBC technical committee review team, habitat within the NCE was considered to be of sufficient quality and quantity to support a population of 200 to 400 grizzly bears (Servheen et al. 1991). More recent carrying capacity modeling suggests the most plausible carrying capacity for the NCE is approximately 280 bears (Lyons et al. 2016). The agencies established a restoration target of 200 bears in the NCE for the purposes of this draft plan/EIS after considering the NCE's carrying capacity and the professional judgment of grizzly bear experts. Restoring a population of this size would likely take decades. This restoration target is not a recovery goal for purposes of the ESA. Recovery goals are determined through a separate process from this EIS.

Despite the historical presence of grizzly bears in the NCE, and the availability of sufficient habitat to recover and maintain a viable population, there is no confirmed evidence of current grizzly bear presence within the NCE grizzly bear recovery zone in the United States (IGBC NCE Subcommittee 2016). The population in the adjacent British Columbia portion of the NCE is estimated to be about six grizzly bears (MFLNRO 2012). Only four confirmed grizzly bear sightings have been documented within the NCE during the past decade; three of these observations were of the same bear, and one observation was of a second bear (IGBC NCE Subcommittee 2016). All of these sightings have been in British Columbia. It

should be noted that grizzly bears in the portion of the NCE in British Columbia are also considered threatened by the British Columbia government. This area, highly fragmented by roads, is surrounded to the west, north, and east by grizzly bear population units (GBPUs) where bears are either threatened or extirpated. Therefore, the likelihood of bears naturally emigrating in the NCE from areas within British Columbia is negligible (Hamilton pers. comm. 2016a).

Since 1990, the FWS has received and reviewed five petitions requesting a change in status for the North Cascades grizzly bear population (55 *Federal Register* [FR] 32103, August 7, 1990; 56 FR 33892, July 24, 1991; 57 FR 14372, April 20, 1992; 58 FR 43856, August 18, 1993; and 63 FR 30453, June 4, 1998). In response to these petitions, the FWS determined that grizzly bears in the NCE warrant a change to endangered status; however, FWS has continued to find that although these petitions are warranted, uplisting is precluded by higher priority listings as documented through the FWS annual Candidate Notice of Review process (FWS 2016a).

In 2016, the FWS continued to find that reclassifying grizzly bears in this ecosystem as endangered is warranted but precluded, and assigned a listing priority number of 9 for the uplisting of the North Cascades population. However, the FWS also acknowledged the possibility that there is no longer a population present in the ecosystem, and restoration efforts (possibly including designation of an experimental population under section 10(j) of the ESA) may be used to establish a viable population in this recovery zone (FWS 2016a).

The main threat to grizzly bears in the NCE is the limited number of bears, with resulting demographic and genetic risks. Natural recovery in the NCE is challenged by the absence of verified reproduction and isolation from any contiguous populations in Canada and the United States.

Status of Grizzly Bears in Other U.S. Ecosystems

Greater Yellowstone Ecosystem. At the time of the grizzly bear listing under the ESA, the southernmost—and most isolated—population was in the GYE, where 136 grizzly bears were thought to live in the mid-1970s. The estimated GYE grizzly bear population increased from as few as 136 in 1975 to a 2014 estimate of approximately 757 (Servheen pers. comm. 2015; Haroldson, van Manen, and Bjornlie 2014), and the grizzly bears have gradually expanded their occupied habitat by more than 100% (NPS 2016a). As monitored by the Interagency Grizzly Bear Study Team, the criteria used to determine whether the population within the GYE has recovered include estimated population size, distribution of females with cubs, and mortality limits as outlined in the 1993 *Grizzly Bear Recovery Plan* (FWS 1993a). The number of females producing cubs has remained relatively stable since 1996, suggesting that the ecosystem may be at or near ecological carrying capacity for grizzly bears (NPS 2016b). Based on the status of the GYE grizzly bear population, the FWS has determined that a change in its listing status under ESA is appropriate. In March, 2016, the FWS issued a proposed rule to remove the GYE population of grizzly bears from the federal list of endangered and threatened wildlife (81 FR 13173–13227, March 11, 2016).

Northern Continental Divide Ecosystem. The NCDE includes the Bob Marshall Wilderness Complex and Glacier National Park in northwestern Montana, and adjacent areas in Canada. The grizzly bear population in this ecosystem numbers approximately 1,000 animals and continues to grow each year (FWS 2015a; Costello, Mace, and Roberts 2016). Similar to the GYE, the FWS *Grizzly Bear Recovery Plan* sets forth criteria for grizzly bear recovery actions in the NCDE and establishes benchmarks by which to gauge species recovery, including population size, sex ratio, number of females with cubs, mortality limits, and geographical distribution within the NCDE (FWS 1993a).

As of 2013, a draft conservation strategy for grizzly bears in the NCDE was available for public review. This document describes management and monitoring programs that would be put into place if and when the NCDE population is delisted from the ESA. These measures are designed to maintain a recovered grizzly bear population in the NCDE. The conservation strategy does not change the legal status of the NCDE grizzly bear population. The FWS will not sign the conservation strategy or delist the NCDE population until state and federal agencies demonstrate their commitment to implementing the conservation strategy (FWS 2015a).

Selkirk Ecosystem. The SE includes approximately 2,200 square miles of northeastern Washington, northern Idaho and southern British Columbia, Canada. Approximately 1,040 square miles of this area is within British Columbia (IGBC 2015a). Similar to other grizzly bear recovery zones, the FWS Grizzly Bear Recovery Plan establishes specific recovery targets and guidelines for the SE (FWS 1993a). The current grizzly bear population in the SE is estimated at approximately 80 grizzly bears (Proctor et al. 2012) and is approximately equally divided between the Canadian and U.S. portions of the ecosystem (IGBC 2015a).

Cabinet-Yaak Ecosystem. The CYE encompasses approximately 1,000 square miles in the Yaak River drainage and 1,620 square miles in the Cabinet Mountains of northwestern Montana and northern Idaho. The ecosystem is bisected by the Kootenai River, with the Cabinet Mountains to the south and the Yaak River area to the north, and is contiguous with grizzly bear habitat in Canada (IGBC 2015b).

Grizzly bear research was conducted in the Cabinet Mountains from 1983 to 1988 to determine habitat use and status of the population. The study concludes that the probability of the loss of this population, which at the time numbered 15 grizzly bears, within the following few decades was high (Kasworm and Manley 1988). In 1990, the FWS initiated the NEPA process to analyze alternatives for testing recovery techniques for the grizzly bear population in the Cabinet Mountains. The short-term objective of the proposal was to test techniques for augmenting the existing grizzly bear population, while the long-term objective was to recover the grizzly bear population in the CYE as required by law. The alternative selected as part of this process was to place 2 subadult female grizzly bears from southeastern British Columbia into the Cabinet Mountains in 1990, followed by 2 additional grizzly bears in 1991 (FWS 1990). Between 1990 and 1994, 4 female grizzly bears were relocated to the Cabinet Mountains from southeastern British Columbia as the initial test of the augmentation program. Through DNA monitoring by the FWS, it was determined that the grizzly bear augmented to the Cabinet Mountains in 1993 remained in the Cabinet Mountain Range, successfully reproduced, and her first generation offspring had also reproduced (Kasworm et al. 2007). Based on the success of initial augmentation efforts, 7 additional female grizzly bears and 3 male grizzly bears were moved from southeastern British Columbia to the Cabinet Mountains from 2005 through 2012 (Kasworm et al. 2013). The current grizzly bear population in the CYE is estimated at approximately 48 to 50 animals (Kendall et al. 2016). In its *2015-2017 Selkirk and Cabinet-Yaak Grizzly Bear Ecosystems Plan*, the IGBC recommends continuation of the Cabinet Mountains augmentation with at least one additional subadult female grizzly bear per year, if available, and also calls for development of a conservation strategy to manage and maintain a recovered grizzly bear population in this ecosystem (IGBC 2015b).

Bitterroot Ecosystem. The BE is one of the largest contiguous blocks of public land remaining in the lower 48 states. The core of the ecosystem contains three designated wilderness areas, which make up the largest block of wilderness habitat in the Rocky Mountains south of Canada. Of the remaining unoccupied grizzly bear habitat in the lower 48 states, this area is considered to have the best potential for grizzly bear recovery, primarily due to the large core of designated wilderness areas. However, grizzly bears do not currently occupy the BE. The last verified grizzly bear in the BE was in 2007, when a black bear hunter mistakenly shot a young male grizzly bear. Through DNA analysis, the grizzly bear was documented to

be from the SE (Servheen pers. comm. 2015). Although there are other occasional reports of grizzly bear sightings in the BE, none have been verified (IGBC 2015c).

The FWS Grizzly Bear Recovery Plan directs the agency to pursue grizzly bear recovery in the BE, along with the other recovery areas discussed above (FWS 1993a). The FWS prepared an EIS and signed a final rule and record of decision in November 2000 to reintroduce a nonessential experimental population of 25 grizzly bears to the BE (FWS 2000b). In June 2001, the FWS reevaluated the decision to reintroduce grizzly bears and published a notice of intent and proposed rule to select the "natural recovery" alternative. The proposed rule would have allowed for protection of grizzly bears that may move into the BE on their own from other areas as a threatened species under the ESA, but would not have allowed for the reintroduction of grizzly bears. The rule was never finalized and therefore the record of decision is still in place to introduce a nonessential experimental population of 25 grizzly bears (Servheen pers. comm. 2015).

ISSUES AND IMPACT TOPICS RETAINED FOR DETAILED ANALYSIS

NEPA regulations require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues …" (40 CFR 1501.7). An issue or environmental issue can be a problem, concern, conflict, obstacle, or benefit that would result if the proposed action or alternatives, including the no-action alternative, are implemented. With respect to grizzly bear restoration in the NCE, the NPS, FWS, cooperators, and the public identified issues related to the following resources or values: wildlife and fish, wilderness character, recreational use and experience, socioeconomics, public and employee safety, and ethnographic resources. Impact topics are headings that correspond to affected resources and allow the reader to track the issues, current condition, and potential impacts related to a specific resource through the various chapters of the draft plan/EIS.

Wildlife and Fish. The NCE is characterized by a high level of variation in climate and topography, resulting in a wide spectrum of habitats ranging from dense, mixed-conifer forests to subalpine meadows to shrub steppe. The NCE is thus home to a high diversity of fish, birds, and other wildlife that have adapted to these diverse habitats. Wildlife could be affected by noise and human-related disturbance associated with the capture and release of grizzly bears. Wildlife or fish species such as elk and deer, black bear, and trout could be affected in terms of grizzly bear predation or competition for resources. Therefore, this impact topic was retained for analysis.

Wilderness Character. Wilderness character can be generally described as the combination of biophysical, experiential, and symbolic qualities that distinguishes wilderness from all other lands. Qualities of wilderness character, derived from the Wilderness Act of 1964, are that the land is untrammeled, undeveloped, natural, offers solitude or unconfined or primitive recreation, or provides other features of value. Sections 2(a) and 4(b) of the Wilderness Act provide a mandate for each agency administering any area designated as wilderness to be responsible for preserving its wilderness character.

A portion of the Pacific Crest Trail in North Cascades National Park

Together, the park complex and surrounding national forest wilderness areas protect over 2.6 million acres of federally designated wilderness within the NCE. Grizzly bear restoration activities could affect wilderness character and values in both adverse and beneficial ways. If grizzly bears are released and monitored in the NCE, the use of aircraft in designated wilderness areas could adversely affect a number of characteristics, including the undeveloped quality and opportunities for solitude or primitive and unconfined recreational qualities of wilderness character. These impacts would be temporary in nature and variable in quantity and duration, since initial restoration activities would require a greater number and frequency of helicopter flights relative to the longer-term adaptive management phase. Restoration of grizzly bears would also increase the overall biodiversity present in wilderness areas and the overall benefits to the natural quality of wilderness character and other features of value. Because grizzly bear restoration actions could result in varying impacts on wilderness, this impact topic was retained for analysis.

Visitor Use and Recreational Experience. The park complex and the national forests within the NCE provide a diverse array of recreational opportunities including hiking, backpacking, camping, climbing, fishing, horseback riding, bicycling, boating, winter sports, and wildlife viewing. Opportunities for hunting are available in the NPS national recreation areas and on the national forests, and off-road vehicle use is permitted on the national forests (USFS 2015a, 2015b). The park complex offers a variety of educational and interpretive programs, visitor facilities, and lodging facilities (NPS 2012b).

The restoration of grizzly bears to the NCE could increase visitation and recreational use of the park and national forests as visitors seek to experience grizzly bears in their native habitat. Restoration actions that result in an increased grizzly bear population could also affect recreational opportunities for visitors who do not wish to encounter grizzly bears. Therefore this topic was retained for analysis.

Public and Employee Safety. Negative interactions between humans and grizzly bears, while rare, do occur. Every situation is dynamic and a grizzly bear's reaction depends on a variety of factors including the proximity between a bear and a human, the type of encounter (i.e., whether the bear is behaving in a defensive or offensive manner), and whether cubs or a valuable food resource are involved, among other considerations (Herrero 2002).

The restoration of grizzly bears in the NCE has raised concerns about safety risks to residents living in and adjacent to the NCE, as well as backcountry recreationists and other visitors because of the potential for negative grizzly bear interactions. Although rare, human injuries from grizzly bears can and have occurred in other ecosystems. For example, in the CYE and SE, where there are low-density recovering populations of grizzly bears (48–50 and 80 bears, respectively), one human injury caused by a grizzly bear has been recorded in the last 36 years (Kasworm pers. comm. 2016a). In addition, the capture,

release, and monitoring of grizzly bears could affect employee safety because of the dangerous nature of the activity. Therefore, this impact topic was carried forward for analysis.

Socioeconomics. The NCE consists of an expansive and largely undeveloped wildland area that spans the crest of the Cascade Range from the more populated, industrialized, urban areas of the Puget Sound region to the more rural, agricultural, and natural resource-based economies of the Okanogan Highlands and Columbia Plateau.

The restoration of grizzly bears in the NCE has raised concerns about economic impacts on natural resource-based industries such as mining and logging. Concerns about depredation of livestock or agriculture, such as fruit orchards, have also been raised. In addition, revenue to local businesses may be affected due to changes in tourism and hunting revenue as a result of grizzly bear restoration. Therefore this topic was retained for analysis.

Ethnographic Resources. Ethnographic resources are landscapes, objects, plants and animals, or sites and structures that are important to a people's sense of purpose or way of life. Ethnographic resources have a special importance for a specific group of people different from the general public (NPS 2015b).

The grizzly bear is an important part of tribal culture and history in the Northwest. The decline or restoration of grizzly bears would be likely to affect ethnographic resources in various ways. For example, the loss of grizzly bears from the ecosystem would result in the loss of an ethnographic resource. However, the restoration of grizzly bears could restrict access to traditional hunting or gathering sites, adversely affecting other ethnographic resources. Therefore, this resource topic was retained for analysis.

Climate Change. Climate change, specifically how a changing climate is expected to affect grizzly bears and grizzly bear restoration efforts over time, is addressed in the individual impact topics where it is relevant. This is because the project is not expected to result in impacts on climate, but climate change occurring as a result of other factors could have pronounced impacts on certain resources such as wildlife and fish. According to the U.S. Environmental Protection Agency, the climate of the Pacific Northwest is changing. Over the last century, the average annual temperature has risen by approximately 1.3°F. Average annual temperature in the region is projected to increase by 3–10°F by the end of the century, with the largest increases expected in the summer. Declines in snowpack and streamflow have been observed throughout the Cascade Range in recent decades. In Washington, record low snowpack values were measured in April 2015 and in 74% of long-term monitoring stations (USEPA 2015). Future climate change impacts would likely be compounded by pressures related to the region's rapidly growing human population. These changes may affect management decisions in the ecosystem for many resources, including grizzly bears.

ISSUES AND IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The following issues and impact topics were dismissed from detailed consideration in the draft plan/EIS.

Air Quality. The NCE lies in the path of prevailing westerly winds blowing from rapidly growing urban-industrial and agricultural areas in Puget Sound. Pollutants such as particulate matter, ozone, acid deposition, mercury, and pesticides have been detected within the park complex. Park managers are cooperatively involved with the U.S. Geological Survey, the NPS Air Resources Division, and others to assess air pollution impacts and protect air quality related resources. The air resources management program at North Cascades includes monitoring, research and data dissemination (NPS 2015c). Some of the activities associated with grizzly bear restoration may result in fossil fuel consumption, such as the

use of vehicles and helicopters to carry out prescribed management activities. However, the increase in emissions from these activities would be minimal and short term, resulting in only slight impacts on regional air quality relative to existing conditions. This topic was therefore dismissed from further analysis.

Greenhouse Gas Emissions. There is strong evidence linking global climate change to human activities, especially greenhouse gas emissions associated with the burning of fossil fuels (IPCC 2014). Some of the activities that could be associated with grizzly bear restoration may result in fossil fuel consumption, such as the use of vehicles and helicopters to carry out prescribed management activities. However, greenhouse gas emissions associated with the plan would be negligible because of the small number of vehicle and helicopter trips that are anticipated and the lack of any other sources of greenhouse gases resulting from grizzly bear restoration. Therefore, the issue of the contribution of grizzly bear restoration activities to climate change through greenhouse gas emissions was dismissed from further analysis. As noted in the discussion of issues, any anticipated effects of climate change on the resources studied in this draft plan/EIS will be discussed in the affected environment and environmental consequences for each resource.

Vegetation. Grizzly bear restoration activities could result in very limited vegetation removal or management associated with creating safe landing zones and release areas or treating invasive plants. A number of measures, as described in chapter 2, would be implemented minimize the impacts that could occur. No impacts on federal or state-listed plant species are expected. Potential impacts on vegetation as wildlife habitat are discussed under the "Wildlife and Fish" impact topic.

Grizzly bears are opportunistic omnivores that eat a wide diversity of plant and animal species (Jacoby et al. 1999; Gunther et al. 2014). Grizzly bears in ecosystems with similar food economies to the NCE have been shown to rely heavily on herbaceous vegetation, graminoids, forbs, berries and roots, depending on the season (Munro et al. 2006; McLellan and Hovey 1995). Grizzly bears have also been shown to act as important vectors for dispersal of seeds for numerous plant species that produce fleshy fruits (Willson and Gende 2004). While the restoration of grizzly bears would result in impacts on native vegetation in the NCE, the expected density of grizzly bears on the landscape is not expected to result in any impacts on native vegetation species on a population level. Further, the effects of grizzly bear foraging on vegetation would represent a native ecological process in the NCE. Since any impacts on native vegetation are expected to be minimal, this topic was dismissed from further analysis.

Federal and State-listed Species. The agencies evaluated the potential impacts on a number of federal and state-listed species to determine whether potential impacts warranted their full analysis in the draft plan/EIS. The following species were initially analyzed: Canada lynx, gray wolf, northern spotted owl, marbled murrelet, bull trout, and a number of listed salmonids. Based on the inclusion of best management practices as described in chapter 2, such as pre-staging and release site-assessments for listed species presence and FWS-established helicopter operations restrictions in proximity to northern spotted owl and marbled murrelet suitable habitat, the agencies determined that the potential impacts would be limited in duration and intensity. Expected duration of impacts on individual species would be limited to a few minutes at any given time, and the intensity of the impact would be limited to disturbance and potential temporary (minutes to hours) avoidance of active restoration areas. In addition, the restoration of grizzly bears could result in some limited competition with lynx and wolves for resources and the predation of certain listed salmonids. However, the level of competition is expected to be low based on resource partitioning and spatial separation, and any predation of listed fish is not expected to have population-level effects. Based on this initial analysis, the expectation that any impacts would be insignificant, and for the purposes of section 7, would result in a "may affect, but not likely to adversely affect" finding, this topic was dismissed from full, detailed analysis. Section 7 consultation under the ESA will be completed once a preferred alternative is identified. Appendix A provides a list of the

potentially affected federal and state-listed species and their designations. Appendix B provides a U.S. Forest Service (USFS) biological evaluation for a number of the species considered.

Geology and Soils. Grizzly bear restoration activities are not expected to result in any ground disturbance. Given the anticipated nature, scope, and scale of restoration activities, no impacts on geology or soil resources are anticipated; therefore, this topic was dismissed from further analysis.

Cultural and Historical Resources (excluding Ethnographic Resources). There are no known cultural, historic, or archaeological resources within the NCE that would be disturbed as a result of actions related to grizzly bear restoration. Therefore, these topics were dismissed from further analysis.

Visual Resources. Grizzly bear restoration activities are not expected to affect visual resources. Any visual impacts that may result from the presence of vehicles, equipment, and personnel during the implementation of grizzly bear restoration activities would be analyzed within the context of Recreational Use and Experience and Wilderness. Therefore, this topic was dismissed from further analysis.

Soundscapes. Acoustic monitoring conducted in 2008 in wilderness areas of North Cascades National Park, and again from 2009 to 2011 in both frontcountry and backcountry areas of the park complex, identified a number of sources of human-caused noise within the park complex that affect the ambient soundscape. Human-caused noises in wilderness areas were found to be relatively infrequent, though the natural ambient sound levels in the park are inherently high due to the presence of flowing water and wind. A wide variety of human-caused noise sources are audible in frontcountry areas, and the contribution of human-caused noise to ambient sound levels in frontcountry areas is greater (NPS 2008a; NPS 2013a). Helicopter flights associated with grizzly bear restoration would take place during a total of 5 to 10 days annually. In addition, fixed-wing aircraft at altitudes above 500 feet above ground level would be used during spring and fall to monitor for reproduction and respond to mortalities. The number and duration of flights would vary based on the number of bears being monitored but would likely be limited to a couple of days per year. Noise impacts related to the use of helicopters and fixed-wing aircraft during grizzly bear restoration activities are addressed within the context of the analysis of impacts on wildlife and fish, wilderness, and recreational use and experience. No long-term changes to the soundscape are expected. As a result, this topic was dismissed from further analysis.

Invasive Species. The implementation of grizzly bear restoration activities could have the potential to contribute to the spread of invasive species such as diffuse knapweed (*Centaurea diffusa*) or reed canary grass (*Phalaris arundinacea*) within the NCE. Given the anticipated nature, scope, and scale of restoration activities, it is expected that avoidance of areas with known invasive plant infestations and mitigation measures such as the proper cleaning of vehicles, equipment, uniforms, and footwear would be sufficient to prevent the spread of invasive species. The agencies would locate and use weed-free project staging areas. In addition, they would avoid or minimize all types of travel through weed-infested areas or restrict travel to those periods when spread of seed or propagules are least likely. Based on these conditions, this topic was dismissed from further analysis.

Environmental Justice. Environmental justice is associated with Executive Order 12898, published on February 11, 1994. This executive order requires all federal agencies to incorporate environmental justice into their mission by "identifying and addressing … disproportionately high and adverse human health or environmental effects of [their] programs, policies and activities on minority and low-income populations in the United States" (Executive Order 12898; 59 FR 7629, 1994).

Census data for communities adjacent to the NCE grizzly bear recovery zone were analyzed to determine whether these communities may qualify as environmental justice populations (minority and/or low-income populations), and whether they would be disproportionately affected by grizzly bear restoration

(U.S. Census Bureau 2013). Census blocks were evaluated in the following counties to determine if environmental justice populations were present: Chelan, Douglas, Grant, King, Kittitas, Okanogan, Skagit, and Snohomish. It was determined that while a small number of communities adjacent to the recovery zone boundary may qualify as minority and/or low-income populations, these communities would not be disproportionately affected by grizzly bear restoration because restoration activities would not be focused in these areas. Therefore, this topic was dismissed from further analysis.

AGENCY COORDINATION

Formal interagency coordination on grizzly bear recovery has been ongoing since formation of the IGBC in 1983. The IGBC was formed to help ensure the recovery of viable grizzly bear populations in the contiguous 48 states through interagency coordination of policy, planning, management, and research. The IGBC consists of representatives from the FWS, NPS, USFS, Bureau of Land Management, U.S. Geological Survey, and the state wildlife agencies of Washington, Idaho, Wyoming, and Montana. The British Columbia Ministry of Environment and Alberta Sustainable Resource Development are also represented (IGBC 2015a).

CEQ regulations regarding the designation of lead agencies state that more than one agency may act as joint lead agencies to prepare an EIS (40 CFR 1501.5). The NPS and FWS are preparing this draft plan/EIS as co-lead agencies. Lead agency designation is based on the magnitude of an agency's involvement; project approval/disapproval authority; expertise concerning environmental effects of the action; duration of agency involvement; and sequence of agency involvement.

CEQ regulations also state that any agency (federal, state, local, or tribal government) that has special expertise with respect to any environmental issue that should be addressed in an EIS may be a cooperating agency upon request of the lead agency (40 CFR 1501.6). USFS lands comprise 74% of the NCE being considered in this plan; therefore, it is participating in this draft plan/EIS process as a formal cooperating agency. The Washington Department of Fish and Wildlife (WDFW) has special expertise with regard to managing wildlife across the state and on USFS lands and is also participating in a formal cooperating agency role for this draft plan/EIS.

Washington State law introduces a unique component to the interagency coordination process. Revised Code of Washington 77.12.035, *Protection of grizzly bears — Limitation on transplantation or introduction — Negotiations with federal and state agencies*, prohibits any agent of the State of Washington from transplanting or introducing grizzly bears into Washington from outside the state:

> The commission shall protect grizzly bears and develop management programs on publicly owned lands that will encourage the natural regeneration of grizzly bears in areas with suitable habitat. Grizzly bears shall not be transplanted or introduced into the state. Only grizzly bears that are native to Washington State may be utilized by the department for management programs. The department is directed to fully participate in all discussions and negotiations with federal and state agencies relating to grizzly bear management and shall fully communicate, support, and implement the policies of this section.

While the law prohibits WDFW from reintroducing grizzly bears from outside Washington, it directs the WDFW to fully participate in all discussions and negotiations with federal and state agencies relating to grizzly bear management.

The above state law prohibits WDFW from transplanting or introducing grizzly bears into the state, and the law does not purport to bind federal agencies. Thus, no conflict exists between state law and the ESA.

To the extent that there is any suggestion that the state statute applies to the federal government, the ESA would preempt this state law, pursuant to the Supremacy Clause of the U.S. Constitution (Article VI, Clause 2). In addition, the Property Clause of the U.S. Constitution (Article IV, Section 3, Clause 2, would also act to preempt the state law because grizzly bear reintroduction would occur on federal lands administered by the NPS or the USFS.

Ultimately, the action selected for implementation as a result of this draft plan/EIS will provide the basis for a long-term, interagency approach to restoring grizzly bears within the NCE. This strategy will seek to integrate the separate responsibilities and activities of the FWS, NPS, USFS, and WDFW.

STATUTES, POLICIES, AND PLANS GOVERNING GRIZZLY BEAR RESTORATION

Endangered Species Act of 1973, as Amended. The purposes of the ESA (16 USC 1531 et seq.) "are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved [and] to provide a program for the conservation of such endangered species and threatened species," among other purposes. It is administered by the FWS and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service. The ESA requires the Secretary of the Interior or the Secretary of Commerce (depending on jurisdiction) to determine whether species are endangered or threatened, and requires all federal agencies to consult with the secretaries on all projects and proposals having potential impacts on federally endangered or threatened plants and animals.

Section 4 of the ESA describes the criteria by which a species may be listed or delisted, describes the endangered species list, and establishes protective regulations for threatened species. A species listed as endangered under the ESA is any species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. On July 28, 1975, the FWS listed the grizzly bear in the lower 48 states as threatened, in part because the species was reduced to only about 2% of its former range south of Canada.

The determination of whether to list a species as threatened or endangered under the ESA is based on any of the following factors, as outlined in section 4(a)(1) of the act:

a. the present or threatened destruction, modification, or curtailment of its habitat or range;

b. overutilization for commercial, recreational, scientific, or educational purposes;

c. disease or predation;

d. the inadequacy of existing regulatory mechanisms; or

e. other natural or manmade factors affecting its continued existence.

Delisting is the removal of a species from the federal lists of endangered and threatened wildlife and plants. To delist a species due to recovery, the FWS must determine that the species is no longer threatened based on an analysis of the five listing factors. This analysis may consider a number of criteria such as population size, recruitment, stability of habitat quality and quantity, and control or elimination of the threats to its continued existence. Recovering species to the point where they can be delisted is the ultimate goal of the ESA (FWS 2004).

The grizzly bear is currently listed as threatened throughout its range. Section 4(d) of the ESA allows for the issuance of special rules for the conservation of threatened species, including limiting the take provisions of section 9 of the ESA (16 USC 1533(d)). Since 1975, four 4(d) rules have governed the take

of grizzly bears, promulgated in 1975, 1985, 1986, and 1992. In 1975 when the grizzly bear was listed, the FWS issued a special rule that applied all of the ESA's take prohibitions except for cases of self-defense or the defense of others, removal of conflict bears, and for scientific research activities not resulting in the death or permanent injury of the animal (40 FR 31734, July 28, 1975). Conflict bears are those bears that demonstrate a non-immediate threat to human safety or commit significant depredation to lawfully present livestock, crops, or beehives. These bears may be taken only if live-capturing and release into suitable habitat would not reasonably eliminate the threat or depredation (50 CFR 17.40(b)). The 1985 and 1986 rules focused on grizzly bear hunting in portions of the NCDE. The allowance of hunting was withdrawn in the 1992 rule. If the NCE grizzly bear population was uplisted to endangered status, the associated 4(d) rules would no longer be in effect because 4(d) rules apply only to threatened species. This means that the take allowances under the 4(d) would no longer be allowed. See additional discussion of "Grizzly Bears in the North Cascades Ecosystem," above.

Section 7 of the ESA provides some of the most valuable and powerful tools to conserve listed species, assist with species recovery, and help protect critical habitat. It mandates all federal agencies to determine how to use their existing authorities to further the purposes of the ESA to recover listed species, to consult with the FWS on proposed actions that have a federal nexus, and to address existing and potential conservation issues (FWS/NMFS 1998). Consultation is required for any threatened or endangered species that could be affected by an agency's action. However, consultation is not required for designated 10(j) nonessential experimental populations, except where species are found in national parks and national wildlife refuges.

Section 9 of the ESA describes prohibited acts under the law. For endangered species, along with other prohibited acts, it is unlawful to take any endangered species (16 USC 1538(a)). The term "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532(19)). However, section 10(a)(1)(A) of the ESA provides exceptions to the take provisions. Under section 10, the FWS may permit acts that purposefully take listed species so long as those actions are for scientific purposes or "to enhance the propagation or survival of the affected species." Section 10(a)(1)(B) allows the FWS to permit take that is incidental to, and not the purpose of, the carrying out of otherwise lawful activities (16 USC 1539(a)(1)).

Section 10(j) of the ESA provides for the reintroduction of experimental populations under special regulation. Prior to the addition of section 10(j), the FWS had authority to reintroduce threatened and endangered species into unoccupied historic range, but such efforts were often met with resistance. One reason for public resistance was that the FWS could not assure private landowners, other federal agencies, and state and local governments that a transplanted population would not disrupt future land management options. An experimental population is a group of reintroduced plants or animals that is geographically isolated from other populations of the species and is typically not considered essential to the survival of the species as a whole. Experimental populations are afforded additional regulatory flexibility regarding management of the species. Washington Administrative Code section 232-12-297 provides for the classification of endangered, threatened, and sensitive wildlife species under state law. "Endangered" refers to any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state. The grizzly bear has been listed as endangered in the State of Washington since 1980 (WDFW 2013a). A discussion on classification and protection of endangered, threatened, and sensitive wildlife species under Washington State law is included in appendix C.

U.S. Fish and Wildlife Service Grizzly Bear Recovery Plan (1993). Section 4(f)(1) of the ESA states that the Secretary of the Interior "shall develop and implement plans for the conservation and survival of endangered species and threatened species …unless he finds that such a plan will not promote the conservation of the species."

The nationwide Grizzly Bear Recovery Plan was finalized in 1982 and updated in 1993. The Grizzly Bear Recovery Plan delineates reasonable actions that are believed to be required to recover and/or protect the grizzly bear. Recovery of the grizzly bear is directed at establishing viable populations in six recovery areas in parts of four states where the grizzly bear was known or believed to exist when it was listed in 1975. The plan outlines a number of criteria specific to each recovery zone by which to gauge grizzly bear recovery, including population size, sex ratio, number of females with cubs, mortality limits, and geographical distribution within the recovery zone (FWS 1993a).

The FWS has assigned the grizzly bear a recovery priority of 9C (FWS 2011a). Recovery priority refers to a number, ranging from a high of 1 to a low of 18, whereby priorities to listed species and recovery tasks are assigned. The criteria on which the recovery priority numbers are based include the following: degree of threat, recovery potential, and taxonomic distinctiveness. Thus, a monotypic genus with a high degree of threat may be assigned a recovery priority of 1, whereas an individual species or subspecies with a low degree of threat might be assigned a recovery priority of 17 or 18. The addition of the letter "C" to a numerical designation indicates the presence of an actual or imminent conflict between the species and development or other economic activities (FWS 2011a). A designation of 9C indicates a species with a high threat and a high recovery potential that is, or may be, in conflict with some form of economic activity (FWS 2011a).

U.S. Fish and Wildlife Service Grizzly Bear Recovery Plan North Cascades Ecosystem Chapter (1997). Specific chapters of the Grizzly Bear Recovery Plan were initially written for four areas, and the evaluation of two other areas, the BE and the NCE, was recommended to determine whether these would also be suitable as recovery zones. Five-year ecosystem evaluations, conducted from 1986 to 1991, were subsequently completed for the BE and NCE, and in December 1991 the IGBC designated both ecosystems as recovery areas (Servheen et al. 1991; Almack et al. 1993). In 1997, a chapter specific to the NCE recovery zone was added to the Grizzly Bear Recovery Plan, as initially recommended by the 1993 recovery plan (FWS 1993a). The priority actions recommended in the NCE chapter are to develop a strategy for implementing the NCE recovery chapter (through reducing human-related direct and indirect mortality, improved sanitation, poaching control, access management, etc.); develop an ongoing educational program to provide information about grizzly bears and grizzly bear recovery to the public; conduct a research and monitoring effort to determine grizzly bear population size and distribution, habitat, and home ranges; and initiate an EIS through the NEPA process to evaluate a range of alternatives for how to recover the population in the NCE (FWS 1997). When the NCE chapter was written, the determination of final recovery goals (e.g., the number of female with young, the percentage of Bear Management Units (BMUs) occupied, and the level of human induced mortality) was not possible because of lack of information for the ecosystem (FWS 1997).

National Park Service *Management Policies 2006*. The NPS *Management Policies 2006* (NPS 2006) provides the NPS with guidance for interpreting and implementing the laws enacted by Congress that govern the management of the national park system. The fundamental basis for these management policies is in the requirements of the 1916 Organic Act, which requires the NPS to preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of present and future generations.

Chapter 4 of the NPS *Management Policies 2006* (NPS 2006), "Natural Resource Management," provides direction regarding the implementation of NPS activities to further the purposes of the ESA:

> The Service manages the natural resources of parks to maintain them in an unimpaired condition for present and future generations in accordance with … environmental laws such as the … Endangered Species Act of 1973 …

The NPS *Management Policies 2006* states that whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species; however, the NPS may intervene to manage individuals or populations to protect rare, threatened, or endangered species. Section 4.4.2.3 states the following:

> The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species.

To meet these obligations, it is NPS policy to cooperate with the FWS to

- ensure NPS actions comply with the ESA;
- undertake active management programs to inventory, monitor, restore, and maintain listed species habitats;
- manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species;
- cooperate with other agencies to ensure that delineation of critical habitat, essential habitat, and/or recovery areas on park lands provides needed conservation benefits to recovery efforts being conducted by all the participating agencies;
- participate in the recovery planning process, including the provision of members on recovery teams and recovery implementation teams where appropriate;
- cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species; and
- conduct actions and allocate funding to address endangered, threatened, proposed, and candidate species.

***North Cascades National Park Service Complex General Management Plan* (1988).** The *North Cascades National Park Complex General Management Plan* (GMP) (NPS 1988) describes a program for managing the park to preserve its pristine environments and keep intrusions to a minimum for the benefit of present and future visitors. The plan also recognizes the park's value, as the most protected portion of the greater NCE, for increasingly rare wildlife populations and for scientific inquiry.

Regarding the management of grizzly bears, the 1988 GMP states the following:

> The North Cascades are home to several mammals that are federally or state listed as rare or threatened. Of particular concern is the grizzly bear, currently the subject of an interagency effort to determine the viability of recovery in the North Cascades. Recent sightings indicate the grizzly bear is found in small numbers in the North Cascades ecosystem. The park will assist in the interagency effort to determine habitat quality within the ecosystem, by focusing on the habitat with the NPS complex. Recovery efforts, if initiated, will be controversial and require a public awareness program (NPS 1988).

Interagency Memorandum of Understanding (1997). In July, 1997, the USFS and NPS agreed to an interim "no-net-loss-of-core area" policy for grizzly bear habitat on federal lands within the NCE. The agreement stipulated that the NPS and USFS agreed to an interim standard of no net loss of core area until the agreement is superseded by a forest/park plan amendment or revision. Core areas are defined as areas

with the following characteristics: (1) No motorized use of roads and trails during the non-denning period. (2) No roads or trails that receive non-motorized, high-intensity use. (3) A minimum of 0.3 mile (500 meters) from any open road, motorized trail, or high use trail. The term "core area" was created in response to research showing that bears, notably females, avoid proximity to roads when and where possible, and therefore the presence, use and density of roads is a critical issue for management agencies to address (IGBC 1998). For more information on the USFS regulatory requirements see appendix B and appendix C.

***Ross Lake National Recreation Area General Management Plan* (2012).** The *Ross Lake National Recreation Area General Management Plan* (GMP) (NPS 2012c) articulates a vision and management philosophy for guiding decision making in Ross Lake National Recreation Area for 15 to 20 years following its adoption in 2012. This plan formalizes management direction, including access management, with respect to the core grizzly bear area for the entire park complex. On NPS lands, the plan replaces the 1997 Interagency Memorandum of Understanding (MOU) establishing an interim "no-net-loss-of-core area" policy for federal lands within the NCE (NPS/USFS 1997). No new roads were proposed in the Ross Lake GMP. New trails proposed in the Ross Lake GMP would constitute reductions of less than 1% in each of four BMUs, in areas that are not high quality grizzly bear habitat. A BMU, generally, is a defined sub-area of an ecosystem that provides a geographical context within which managers can focus efforts to effectively manage and conserve grizzly bears. The Ross Lake GMP states that the NPS will "strive to minimize, avoid or mitigate impacts on high quality spring and fall grizzly bear habitat." The intent of the Ross Lake GMP is to retain core area ratios at a level of 70% or higher per BMU. The plan requires a habitat assessment for any proposed development within Ross Lake National Recreation Area, North Cascades National Park, or Lake Chelan National Recreation Area.

In addition to the preceding grizzly bear-related laws, policies and plans, appendix C provides additional discussion of other statutes, policies, and plans that must be considered in the NEPA process, including those that direct and guide management on the Mt. Baker-Snoqualmie and Okanogan-Wenatchee National Forests. Appendix B provides additional support for the USFS's decision making.

Chapter 2:

ALTERNATIVES

CHAPTER 2: ALTERNATIVES

INTRODUCTION

The *National Environmental Policy Act* (NEPA) requires federal agencies to explore a range of alternatives and analyze impacts that any reasonable alternatives could have on the human environment. This chapter describes the various actions that could be implemented for grizzly bear restoration in the U.S. portion of the North Cascades Ecosystem (NCE).

The alternatives under consideration must also include a "no-action" alternative as prescribed by 40 Code of Federal Regulations (CFR) 1502.14. Alternative A in this *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (draft plan/EIS) is considered to be the "no-action" alternative because it is the continuation of current management. The alternatives presented in this chapter were developed and discussed by the interagency planning team made up of representatives from the U.S. Fish and Wildlife Service (FWS), National Park Service (NPS), U.S. Forest Service (USFS) and the Washington Department of Fish and Wildlife (WDFW). Feedback received during the public scoping process was also considered when developing the range of alternatives (see "Chapter 5: Consultation and Coordination"). For a discussion of the potential costs associated with each alternative see appendix D.

Action alternatives carried forward for detailed analysis must meet the purpose of and need for taking action described in "Chapter 1: Purpose of and Need for Action" to a large degree. Action alternatives are considered to be reasonable if they are technically and economically feasible and show evidence of common sense (CEQ 1981). The "Environmental Consequences" chapter of this draft plan/EIS presents the results of the impact analysis for each alternative. Other alternatives were dismissed from detailed consideration because they would not adequately satisfy the purpose and need for this action or are not technically feasible, and are discussed later in this chapter. Alternatives considered but dismissed from detailed consideration include the following:

- Washington Only Restoration
- Delayed Implementation of Washington Only Restoration
- Natural Recovery
- Ecosystem Restoration and Habitat Preservation Only
- Social Tolerance-Based Grizzly Bear Restoration
- Section 10(j) Population with Citizen Management
- Capture and Release of Healthy, Young Females Only

ALTERNATIVE A: CONTINUATION OF EXISTING GRIZZLY BEAR MANAGEMENT (NO ACTION)

The no-action alternative (alternative A) would continue existing management practices and assumes no new actions would be implemented beyond those available at the outset of the grizzly bear restoration planning process. Based on the Revised Code of Washington 77.12.035, described in chapter 1, alternative A is the only alternative being evaluated in detail that would allow for the full participation by the state of Washington.

The no-action alternative would be a continuation of existing management practices and assumes no new management actions would be implemented beyond those available at the outset of the grizzly bear restoration planning process.

Under the no-action alternative, options for grizzly bear restoration would be limited. The North Cascades National Park Service Complex (park complex) and the surrounding national forests do not have independent grizzly bear restoration plans, and current NPS and USFS planning documents do not call for specific actions related to the restoration of a grizzly bear population. Guidance for grizzly bear restoration and management in the NCE is provided in the NCE chapter of the nationwide Grizzly Bear Recovery Plan (FWS 1997). The priority actions recommended in the NCE chapter of the recovery plan are to develop a strategy for implementing that chapter (through reducing human-related direct and indirect mortality, improved sanitation, poaching control, access management, and other methods); developing an ongoing educational program to provide information about grizzly bears and grizzly bear recovery to the public; conducting research and monitoring to determine grizzly bear population size, distribution and trend, habitat, and home ranges; and initiating an environmental impact statement (EIS) through the NEPA process to evaluate a range of alternatives for how to recover the population in the NCE (FWS 1997). Since the drafting of the NCE chapter, it has become clear that the NCE lacks sufficient evidence to suggest a grizzly bear population exists.

Under the no-action alternative, grizzly bears would not be released into the NCE. However, grizzly bears would not be prevented from moving into the NCE from other ecosystems—the closest ecosystems include the SE and grizzly bear units in British Columbia. Grizzly bears that move into the NCE would be fully protected as a threatened species under the *Endangered Species Act* (ESA).

The direction provided in the 1997 Interagency Memorandum of Understanding (MOU) between NPS and USFS and formalized in the *Ross Lake General Management Plan* (GMP) would continue under the no-action alternative. The intent of the Ross Lake GMP to retain core area ratios at a level of 70% or higher per Bear Management Unit (BMU) would continue to guide access management on NPS lands under the no-action alternative. Most BMUs in the park complex cover areas that extend to USFS lands adjacent to the park complex, and most non-core areas within these shared BMUs are located on USFS land. Any proposal for development within the NPS portion of a shared BMU would consider the portion of the BMU on USFS lands: any loss of core area on NPS lands would affect the core ratio for the entire BMU. Any loss of core area within the park complex would likely require mitigation on USFS land to maintain no net loss of core area for the BMU as a whole. The USFS would continue management under the no-net-loss agreement established by the 1997 interagency MOU until forest plans are revised or amended.

Sanitation measures would continue to be implemented for both black bears and grizzly bears, including bear-resistant trash receptacles and bear-resistant food storage lockers in NPS and USFS campgrounds, and a bear-resistant food canister loan program (on NPS lands). Current backcountry campground design protocol separating food preparation/storage areas from tent pads on NPS lands would continue to be implemented.

Multi-agency public education efforts concerning grizzly bears in the NCE and the governance of ongoing grizzly bear management activities by the Interagency Grizzly Bear Committee (IGBC) would continue. Visitors would be encouraged to report grizzly bear sightings, and the NPS, USFS, and the IGBC would provide opportunities for visitors to report grizzly bear sightings via interpretive media at the park as well as online tools.

Photo Credit: National Park Service

Black bear in hair snag corral

Monitoring with remote cameras and hair snags would continue as funds allow, as would the compilation of a dataset to determine grizzly bear presence and habitat selection (hair snag corrals are composed of a strand of barbed wire strung in a "corral" among trees, with a powerful scent attractant poured onto a brush pile at its center. Animals drawn to the scent leave tufts of hair on the barbs as they investigate).

Consultation with FWS under section 7 of the ESA would continue, and land acquisition by the NPS, USFS, and state agencies to permanently conserve grizzly bear habitat would continue to be a management option.

OVERVIEW OF ACTION ALTERNATIVES

The action alternatives described in this chapter represent options for restoring grizzly bears to the NCE. As a result of the alternatives development process, the agencies have identified action alternatives that consider different ways of restoring grizzly bears to the NCE. "Alternative B: Ecosystem Evaluation Restoration" would release up to 10 grizzly bears over the first 2 years of initial restoration activities and monitor released bears for habitat use and incidence of human conflict over several seasons to inform future releases. "Alternative C: Incremental Restoration" would seek to release up to 5 to 7 grizzly bears per year for 5 to 10 years to achieve an initial population of 25 bears intended to reestablish reproduction in the NCE. It is anticipated that each of these alternatives would result in the achievement of the restoration goal of 200 bears within approximately 60 to 100 years. "Alternative D: Expedited Restoration" would seek to release bears into the NCE at a rate similar to alternative C, but over a longer initial period until approximately 200 bears are on the landscape (taking into account reproduction by translocated grizzly bears). While it would be difficult to estimate when precisely 200 bears were present on the landscape, this alternative would likely achieve the restoration goal in approximately 25 years. Each alternative is described in detail below in terms of a primary phase and adaptive management phase. A table included at the end of this chapter shows a summary of the actions proposed under each action alternative.

ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

Restoration Population Goal

As noted in chapter 1, based on a qualitative assessment by the IGBC technical committee review team, habitat within the NCE was considered to be of sufficient quality and quantity to support a population of 200 to 400 grizzly bears (Servheen et al. 1991). Based on recent modeling, researchers assessing the grizzly bear carrying capacity of the NCE estimated that the habitat could support approximately 280 grizzly bears (Lyons et al. 2016). The agencies established a restoration target of 200 bears in the NCE for the purposes of this draft plan/EIS after considering the NCE's carrying capacity and the professional judgment of grizzly bear experts. The restoration goal is thus seen as a population size that can reasonably be expected to sustain itself in the long term with minimal to no active human intervention. This restoration goal could be adjusted based on information gained through the monitoring of grizzly bears and their overall population response during the adaptive management phase of this project. For the purposes of this plan, the restoration goal would not necessarily mean that the population is recovered to the point of de-listing under the ESA (see appendix C for a discussion of the ESA and delisting process).

Conflict Grizzly Bear Management

In 1986, the IGBC originally developed guidelines for identifying management actions needed to respond to human-grizzly bear conflicts. In 2002, the IGBC NCE Subcommittee revised those guidelines to make them more relevant to conditions within the NCE (appendix E). Current guidelines set forth conditions for determining whether a grizzly bear has caused depredation to livestock or obtained unnatural food sources (human and livestock foods, garbage); displayed aggressive/threatening behavior toward humans; or had a human encounter resulting in substantial human injury or loss of life. Depending on the type of encounter, the age and sex of the grizzly bear, and the number of encounters the grizzly bear has been involved in, the guidelines prescribe either relocation of the grizzly bear or its removal from the population. Prior to the implementation of any action alternative, the agencies intend to ask the subcommittee to consider the need to modify the 2002 revised guidelines to: (1) ensure compliance with applicable federal and state laws, (2) address public input on this draft plan/EIS, and (3) ensure consistency with any 10(j) experimental population designation for the NCE (see "Endangered Species Act Section 10(j) Designation Rulemaking Option," below).

Capture, Release, and Monitoring of Grizzly Bears

Food economy *refers to the dominant foods available to grizzly bears in a given area.*

Under all of the action alternatives, grizzly bears would be captured from multiple areas. The agencies would seek to find source areas that have a healthy grizzly bear population so that removal of grizzly bears would not affect population viability, as the capture and removal of grizzly bears would be considered a mortality for the source population. In addition, it would be more likely that grizzly bears meeting the selection criteria (e.g., sex and age class) may be captured in areas with large grizzly bear populations. The entities managing the donor source area must be willing to donate bears that meet the selection criteria and allow trapping of an adequate number of grizzly bears. All regulatory requirements would be fulfilled prior to translocation of bears, including coordination with Canadian entities as necessary. In addition to a healthy population, source areas must be ecologically similar to the North Cascades (i.e., there should be a high likelihood that candidate bears do not rely on salmon for a significant portion of their diet, and that candidate bears do not have a history of conflict with humans). The lead agencies would focus on capturing grizzly bears that share a similar ecology and food economy to potential release areas. *Food economy* refers to the dominant foods available to grizzly bears in a given area. Dominant foods in the NCE are expected to be

similar to the west side of the Northern Continental Divide Ecosystem (NCDE) in northwestern Montana, adjacent grizzly bear habitat in British Columbia, Canada, and grizzly bear habitat in south-central interior British Columbia. In these areas, berries are the dominant food source providing calories and ultimately fat production necessary for a grizzly bear to survive hibernation and to reproduce. As a result, these areas would be the most likely sources selected for capturing bears for release into the NCE. Additional selection criteria based on the age and sex class of the captured grizzly bears are described in each alternative below.

Under all of the action alternatives, grizzly bears would be captured using baited foot snares or culvert traps (Jonkel 1993). It is possible that helicopter support would be used for the capture of grizzly bears in designated wilderness or roadless areas and could include the use of helicopter-based capture darting. The capture and release of grizzly bears would take place between early summer and early fall, depending on the capture and release site(s) selected and availability of food.

Grizzly bears would be transported from capture locations to release staging areas by truck. Staging areas would be located in previously disturbed areas large enough for the safe landing of a helicopter, parking for a fuel truck, and any other grizzly bear transport and handling needs.

Photo Credit: FWS

Female grizzly bear and cubs being released from culvert trap

Grizzly bears would be transported by helicopter and released in remote areas on NPS or USFS lands. Release sites would be chosen based on selected habitat criteria, connectivity to other areas, and the need to have grizzly bears in close proximity to one another to facilitate interaction and ultimately breeding. Additional criteria for acceptable release sites would include the following:

- The area would largely consist of highly suitable seasonal habitat; specifically, berry-producing plants that are known grizzly bear foods would be readily available in the area.
- The area would be largely roadless, with non-motorized use and low human use. Areas would be an adequate distance from high visitor use, non-motorized areas, such that low human-use areas would be targeted.
- BMUs with a high amount of core area would be prioritized.
- The area would have a suitable helicopter landing site or a suitable vehicle-accessible site (with little public use) available for release.
- Selection of subsequent release sites would be informed by grizzly bear resource selection as determined through monitoring of grizzly bears previously released into the ecosystem.

See figure 2 for general areas where grizzly bears could be released.

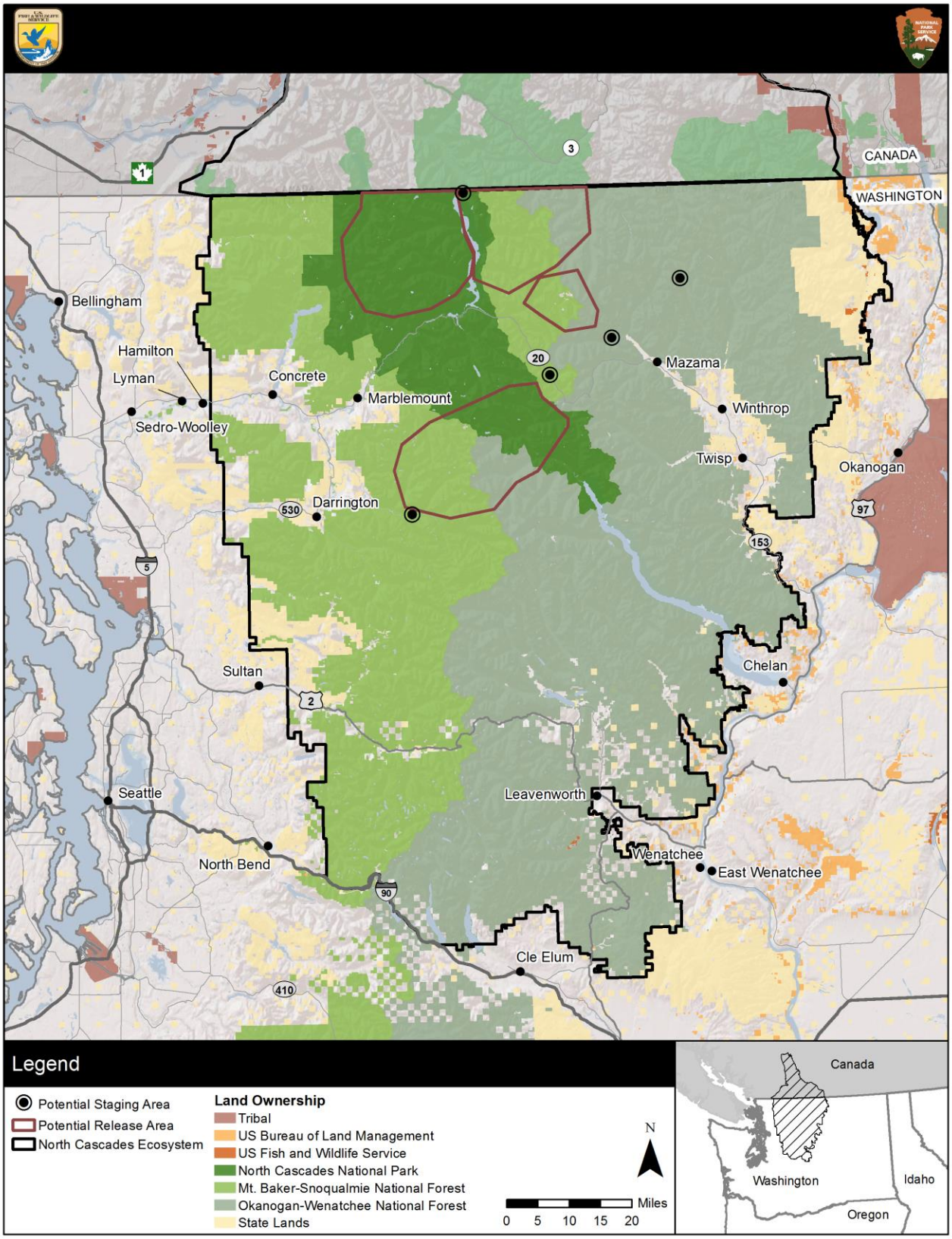

FIGURE 2. GRIZZLY BEAR STAGING AND RELEASE AREAS

All translocated grizzly bears would be fitted with global positioning system (GPS) collars prior to release to monitor habitat use and spatial distribution, and tissue samples would be collected prior to release for genetic monitoring purposes. Sites for subsequent releases of grizzly bears during the adaptive management phase of the restoration process would be chosen based on the criteria listed above and limited to federal lands, unless otherwise authorized by landowners. Recapture of grizzly bears would be conducted periodically to maintain a GPS-collared sample of the population. Helicopters would be used to ferry in culvert traps from which grizzly bears would be released, and could possibly be used for the retrieval of dropped GPS collars or in response to bear mortality.

Each release could take up to eight hours (one day) depending on the distance between staging and release areas, potentially resulting in 5 to 10 days of helicopter use per year for releases. Helicopters would make up to four round trip flights, traveling approximately 500 feet above the ground, and up to four landings in wilderness per grizzly bear, which would be necessary for the release of each grizzly bear and drop-off and retrieval of staff and the culvert trap, although some additional flights may be necessary for collar retrieval and incidental actions. All operations would be conducted during daylight hours. Depending on the location of the release site and corresponding staging area, helicopter flight time over designated wilderness areas would vary. Table 1 provides the range of total hours helicopters would be operating over and in wilderness per grizzly bear release.

TABLE 1. ESTIMATE OF FLIGHT TIME OVER WILDERNESS AREAS

Proposed Staging Area	Hours Over Wilderness Per Release
Eight Mile (Billy Goat)	4–4.8
Hozomeen	2.2–3.6
Swamp Creek Pit	0.15–1.8
Green Mountain	1.6–2.4
West Fork Methow	0

If release sites can be accessed via roads that have been closed with gates or other physical barriers, it is possible that culvert traps could be transported by truck.

Fixed-wing aircraft would be used for periodic monitoring. Monitoring activities would take place from early spring to late fall and would be accomplished through cooperation with FWS, NPS, USFS, and WDFW. Flights would be limited to several days during spring or fall, depending on the number of bears collared, to monitor for reproductive success and population growth. Camera stations would also be set-up in remote areas to monitor grizzly bear presence.

A number of mitigation measures have been identified to reduce the potential impacts on resources considered in this draft plan/EIS. The following list of mitigation and best management practices would be implemented:

- Locate and use releases sites that are more than 1,200 feet (400 meters) from suitable nesting habitat for northern spotted owls and marbled murrelets or only use the sites after the nesting period (March 1 to July 31 for northern spotted owls and April 1 to September 23 for marbled murrelet).
- Fly at least 500 feet above ground level to avoid disturbance to any nesting birds when departing staging areas by helicopter.
- Restrict helicopter activity within 1,000 feet of an active bald eagle nest
- Locate and use weed-free project staging areas.

- Avoid or minimize all types of travel through weed-infested areas or restrict travel to those periods when spread of seed or propagules are least likely.
- Conduct pre-implementation staging and release site assessment and implement mitigation as necessary to avoid presence of federal or state-listed species.
- Reduce the time that helicopters spend over campsites or along trails by taking the most efficient routes to and from the release site.

Public Education and Outreach

Under all of the action alternatives, increased public education efforts would be conducted related to the outcome of the restoration program. At the outset of initial restoration activities, NPS and FWS would provide public updates as often as every week. These updates would provide generalized information on grizzly bear movements and locations. As the restoration process moves forward, it is anticipated that these updates would take place less frequently, likely monthly, unless specific events with the potential to affect grizzly behavior, such as a large fire, occur. Each agency would use the NCE grizzly bear website to post the results of management actions and annual monitoring.

Outreach to residents and visitors, including hikers and hunters, would be increased to aid them in avoiding encounters with grizzly bears, including education about bear spray and proper storage of attractants. Hunters could receive increased species identification training to prevent cases of mistaken identity where grizzly bears are mistaken as black bears. All hunters would be provided with additional grizzly bear information.

Replacement and Additional Releases of Grizzly Bears

Under all of the action alternatives, grizzly bears lost during the primary phase of restoration as a result of any source of mortality, human-caused or otherwise, would be replaced on a one-to-one basis. Likewise, grizzly bears that emigrate out of the NCE or are removed as a result of conflict with humans would be replaced. This approach would continue until the initial target population size is reached. For example, under alternatives B and C, the lead agencies would replace grizzly bears if the population dropped to fewer than 10 individuals for alternative B and 25 individuals for alternative C.

Access Management

Under all of the action alternatives, occasional short-term closures (a few hours up to a couple of days) could take place on a case-by-case basis, based on bear activity (e.g., a female with cubs near high human use areas). No long-term closures or modifications to public access would be implemented. The agencies would coordinate with local tribes to ensure that release sites and timing do not restrict access to traditional sites. Other access restrictions may occur under other implementation decisions by the agencies, which would be unrelated to the alternatives considered in this draft plan/EIS.

Habitat Management

The NPS would strive to achieve the current policy of no net loss of core area on lands under management direction provided in the Ross Lake GMP (NPS 2012c). Likewise, the USFS would seek to continue to achieve the same policy on USFS lands until forest plans for Okanogan-Wenatchee and Mt. Baker-Snoqualmie National Forests are revised.

ALTERNATIVE B: ECOSYSTEM EVALUATION RESTORATION

Primary Phase

During the first and second summers of grizzly bear restoration, a total of up to 10 grizzly bears would be released in the NCE at a single remote site. The site would be located on NPS or USFS lands and would be selected based on habitat criteria. Releases would be limited to a single site to facilitate interaction and breeding among the bears that are released. Grizzly bears that would be considered optimal candidates for capture and release would be independent subadults between 2 and 5 years of age that had not yet reproduced and had exhibited no history of human conflict. The target sex ratio for initial releases would be approximately 60% to 80% female and 20% to 40% male.

There would be no additional releases of grizzly bears for two seasons following the initial releases, except for the replacement of grizzly bears lost due to mortality, emigration, or removal due to human conflict. Instead, the grizzly bears released during the first 2 years (years 1 and 2) would be monitored for an additional 2 years (years 3 and 4) with regard to habitat use and instances of human conflict, for a total of 4 years of monitoring. In the fourth year, a decision would be made regarding how management would proceed during subsequent years. Depending on the results of monitoring, the NPS and the FWS may choose to repeat the initial release described above, wherein an additional ten bears would be released at a single site over 2 years followed by two additional years of monitoring. Alternatively, the NPS and the FWS may choose to transition to alternative C with the goal of establishing an initial population of 25 grizzly bears by releasing an additional 5 to 7 grizzly bears in the NCE each summer.

Adaptive Management Phase

Successful management of natural systems is a challenging and complicated undertaking. Adaptive management—a process of monitoring outcomes and adjusting management techniques over time—is based on the assumption that current resources and scientific knowledge are limited, and a certain level of uncertainty exists. An adaptive management approach attempts to apply available resources and knowledge and adjust management techniques as new information is revealed (Williams and Brown 2012). U.S. Department of the Interior regulations define adaptive management as "a system of management practices based on clearly identified outcomes and monitoring to determine whether management actions are meeting desired outcomes; and, if not, facilitating management changes that will best ensure that outcomes are met or re-evaluated" (43 CFR 46.30). Adaptive management recognizes that knowledge about natural resource systems is sometimes uncertain. U.S. Department of the Interior regulations for implementing NEPA suggest that adaptive management should be used "in circumstances where long-term impacts may be uncertain and future monitoring will be needed to make adjustments in subsequent implementation decisions" (43 CFR 46.145).

Key uncertainties associated with the implementation of this draft plan/EIS process include accurately predicting grizzly bear behavior, habitat utilization, and movements once released; reproductive success; genetic limitations; and source and rate of mortality. Therefore, it is important to consider management actions that could be influenced, as well as how various metrics could be managed and monitored. Elements to measure or monitor during the adaptive management phase would include habitat selection, instances of conflicts between humans and grizzly bears, reproductive success and rate of population growth, and genetic composition of the population.

***Adaptive management**—a process of monitoring outcomes and adjusting management techniques over time—is based on the assumption that current resources and scientific knowledge are limited and a certain level of uncertainty exists.*

Under alternative B, adaptive management would be built into the primary phase of restoration by way of the two-year monitoring for habitat use and human-bear conflict. This adaptive approach would determine the future course of action taken by the NPS and FWS. Based on monitoring and associated bear behavior, managers would either repeat the primary phase of alternative B and continue to monitor bear habitat use and incidents of human-bear conflicts or transition to implementing the primary phase of alternative C. If the decision is made to transition to alternative C, restoration actions would result in the release of additional bears until an initial restoration goal of approximately 25 grizzly bears is achieved. Subsequent release sites would be chosen based on the habitat selection and utilization data collected during the 4 years of monitoring. In addition, releases would occur during the adaptive management phase based on a number of factors, including human-caused sources of mortality, genetic limitations, population trends, and adjustment of sex ratio. For the purposes of assessing impacts, the agencies assumed that managers would need to add 1 male and/or 1 female grizzly bear every few years depending on monitoring and the need being addressed. Subsequent release sites would continue to be evaluated and selected based on longer-term monitoring of grizzly bear habitat use and movements. Release sites may be removed from use based on factors such as mortality, emigration, or human-bear conflict. Grizzly bears could also be removed or relocated based on conflicts with humans.

ALTERNATIVE C: INCREMENTAL RESTORATION

Primary Phase

During the primary phase of restoration, it is anticipated that 5 to 7 grizzly bears would be released into the NCE each year over roughly 5 to 10 years, with a goal of establishing an initial population of 25 grizzly bears. This is the likely number of grizzly bears that could feasibly be trapped and released within 5 to 10 years, and also serves as a small source population to help reestablish reproduction in the NCE. Taking into account the projected range of mortality and emigration rates for bears released into the NCE under the initial restoration phase of alternative C, it is anticipated that the achievement of the initial restoration goal of 25 bears would require the placement of approximately 34 bears in total.

Grizzly bears released into the U.S. portion of the NCE under alternative C would be selected based on the same criteria as described under alternative B. Grizzly bears would be released at multiple sites in remote areas on NPS and USFS lands, which would be chosen based on selected habitat criteria. Release sites would be in close proximity to one another to facilitate interaction and breeding among grizzly bears released into the ecosystem.

It is expected that additional grizzly bears would be released under the adaptive management phase of the plan as described below.

Adaptive Management Phase

Once an initial population of up to 25 grizzly bears is achieved, a transition to the adaptive management phase would occur. In this phase, additional grizzly bears could be released to address mortality, population trends, genetic limitations, or to improve reproductive success or population distribution. For the purposes of assessing impacts, the agencies assumed that managers would need to add 1 male and/or 1 female grizzly bear every few years depending on monitoring and the need being addressed. Subsequent release sites would be chosen based on habitat selection and utilization data collected through monitoring

Under alternative C, once an initial population of up to 25 grizzly bears is achieved, a transition to the adaptive management phase would occur.

during the primary phase of this alternative. Release sites may be removed from use based on factors such as mortality, emigration, or human-bear conflict. Agencies would continue to monitor grizzly bears to measure reproductive success, survival, and habitat use.

ALTERNATIVE D: EXPEDITED RESTORATION

Primary Phase

Under alternative D, agencies would seek to expedite grizzly bear restoration by releasing additional grizzly bears into the NCE over time until the restoration goal is reached. This alternative would not limit the population goal for the primary restoration phase to 25 animals; rather, the number of suitable grizzly bears captured in a given year would be released into the NCE. It is anticipated that the logistics and capacity of management agencies to carry out capture and release would constrain the ability to release a large number of grizzly bears in any single year under this alternative (the actual number of grizzly bears to be released per year would likely be 5 to 7).

Capture and release efforts would continue each year as necessary until a combination of release efforts and reproduction results in a population of approximately 200 grizzly bears on the landscape. It is estimated that alternative D would require the release of 155 to 168 bears. Criteria for age and sex ratios for grizzly bears captured and released under alternative D would be less restrictive than under alternatives B and C. Grizzly bears up to 10 years old would be targeted for capture and release, and the sex ratio could be as many as 1 male for every 2 females. Similar to alternative C, grizzly bears would be released at multiple sites on NPS and USFS land based on habitat criteria. This alternative could be constrained somewhat by the availability of candidate bears if one or more of the source area populations reaches a point where it can no longer sustain the effective mortality that capture of candidate grizzly bears would entail. In such a case, it may become necessary to re-evaluate the use of certain source areas over the course of the restoration effort. Under alternative D, grizzly bears would be monitored for habitat use and incidences of human conflict, but once the population goal of approximately 200 grizzly bears is reached, no additional grizzly bears would be released.

Adaptive Management Phase

Under alternative D, subsequent releases would be unlikely under an adaptive management framework.

Under alternative D, the initial population established would be equivalent to the restoration goal; therefore, subsequent releases would be unlikely under an adaptive management framework. However, grizzly bears would be monitored for genetic diversity and if necessary additional grizzly bears may be added over time, as described under "Elements Common to All Action Alternatives."

ENDANGERED SPECIES ACT SECTION 10(J) DESIGNATION RULEMAKING OPTION

Grizzly bears released into the NCE would be managed as a threatened species under the ESA under all action alternatives. However, an option would be available under any of the action alternatives to designate grizzly bears in the U.S. portion of the NCE as a 10(j) experimental population under section 10 of the ESA. To relieve concern that translocations may result in restrictions on the use of private, tribal, or public land, Congress added the provision for experimental populations under section 10(j) of the ESA. An experimental population is a group of reintroduced plants or animals that is geographically isolated from other populations of the species that is typically determined to be "essential" or "nonessential" to the survival of the species as a whole but contributes to their recovery. Section 10(j) provides for the

reintroduction of experimental populations under special regulations and may include protective regulations established under authority of section 4(d) of the ESA.

Designation of grizzly bears released into the NCE as an experimental population would provide the lead and cooperating agencies with greater management flexibility, provided that management actions remain consistent with conservation of the experimental population. The designation allows for the advancement of recovery objectives by providing an opportunity to reestablish self-sustaining populations.

The types of management actions anticipated under an experimental population would focus on supporting grizzly bear reestablishment in the NCE while reducing or avoiding potential land use and other conflicts in areas both inside and outside the NCE. These management actions could include retrieving released bears that move outside the NCE or venture into areas with a high potential for conflict; lethal or non-lethal removal of nuisance bears; capture and handling of bears for purposes of monitoring and research; and issuing permits to private landowners to harass, haze, or kill bears that are attacking livestock on private lands when it has not been possible to capture or deter depredations through other means. Experimental population designation is not necessary to kill a bear in self-defense or to defend others; this action would continue to be allowed under an experimental population designation. The allowance to take grizzly bears in self-defense or in the defense of others stems from the 4(d) rule established when the bear was listed (see chapter 1 for a general discussion of the 4(d) rules).

The experimental population area boundary would likely encompass the geographic extent of potential movement of bears restored to the NCE plus a geographic margin of management assurance beyond this extent. In developing an experimental population boundary, the potential movement of bears and how to manage bears in the future needs to be considered as any restoration effort proceeds and as recovery progresses. Three general regions of potential grizzly bear use or future presence can be described in association with this restoration effort: the core region, areas adjacent to the core where bear movements could occur over time, and areas that are incompatible or unnecessary for the recovery of grizzly bears.

The core region or location of primary use is expected to coincide with the area of the NCE grizzly bear recovery zone—the focus of grizzly bear restoration within the NCE. However, towns and cities located within this area would be excluded from this core area and would not be considered suitable grizzly bear habitat.

Adjacent to the NCE, a region could be identified that contains areas of potentially suitable habitat where bears may disperse or move to over time. Within this region, the likelihood of grizzly bear occurrence is expected to greatly diminish farther away from the NCE grizzly bear recovery zone or outside of areas of potentially suitable habitat. Having the management flexibility allowed under an experimental population designation would be important to avoid or minimize any potential conflicts from bears that may enter this region. Although this adjacent region is not the focus of the restoration effort to the NCE, grizzly bears could foreseeably move into and use some areas within this region in the future.

Finally, beyond these areas of potentially suitable habitat or potential dispersal, a region that is incompatible or unnecessary for the recovery of grizzly bears would be identified. This region would contain habitat that is largely unsuitable and in an area where bears are unlikely to disperse. However, including all or a portion of this region as part of any experimental population designation under section 10(j), would allow additional levels of management that would otherwise be unavailable under the ESA should any individual grizzly bear unexpectedly reach this region. This would provide a greater margin of management flexibility and a means to avoid or resolve any land-use conflicts should bears ever make it to areas within this outer region. The maximum outer extent of this region could potentially be drawn as large as the Washington State boundary, with the exception of the area surrounding the SE grizzly bear population and the Kettle-Granby Population Unit of grizzly bear.

If the FWS decides to pursue the designation of a 10(j) experimental population under any of the action alternatives, the FWS would conduct a separate rulemaking process, which would be initiated during this environmental review process and would be subject to its own comment period. In order for a 10(j) designation to occur, the rulemaking process must determine that the translocation of grizzly bears would further the conservation of the species.

Table 2 provides a summary of the three action alternatives that are fully evaluated in this draft plan/EIS.

TABLE 2. SUMMARY OF ACTION ALTERNATIVE ELEMENTS

Element	Alternative B: Ecosystem Evaluation Restoration	Alternative C: Incremental Restoration	Alternative D: Expedited Restoration
Number of Grizzly Bears to be Released			
Source of grizzly bears that share similar ecology	Multisource.	Multisource.	Multisource.
Primary Phase – Number of bears to be released per year Note: Grizzly bears would be replaced based on any source of mortality and emigration for all alternatives during the primary phase.	Up to 10 grizzly bears released in first 2 years; monitor for habitat use and human conflict over years 1–4 and make decision in year 4 for additional release of grizzly bears in year 5.	5 to 7 grizzly bears per year over 5–10 years to achieve an initial population of 25 grizzly bears.	Maximum number of grizzly bears available for capture (anticipated to be 5–7 per year) would be released each year to achieve a minimum population estimate of ~200 grizzly bears on the landscape over shortest possible time frame (the 200 population estimate would include reproduction).
Sex and age class of released grizzly bears	Target grizzly bears roughly 2–5 years old depending on independence and breeding status. Target 40% male; 60% female.	Same as alternative B.	Less restrictive for age and sex ratio given the need for a larger number of grizzly bears. Target grizzly bears up to 10 years old.
Adaptive Management Phase Activities – Number of grizzly bears to be released per year after the primary release	Default to alternative C or repeat primary phase as specified in alternative B depending on results of monitoring information, such as habitat use and human conflict.	Number based on adaptive management criteria. Additional bears would be released based on a number of factors including the following: • human-caused sources of mortality • genetic limitations • population trends • adjustment of sex ratio.	No adaptive management phase.
Time to achieve restoration goal (200 bears in the NCE)	Approximately 60–100 years. Slightly longer (approximately 2 to 5 years) than alternative C because of the 2 year pause for monitoring.	Approximately 60–100 years.	Approximately 25 years.

Element	Alternative B: Ecosystem Evaluation Restoration	Alternative C: Incremental Restoration	Alternative D: Expedited Restoration
ESA Designation			
Section 10(j) designation option	The option to designate the NCE grizzly bear population as an experimental population under section 10(j) of the ESA would be common to all of the action alternatives. If the option was not implemented, the population would be managed as a threatened species under all of the action alternatives.		
Spatial Extent of Grizzly Bear Release Sites	Release sites would be based on capture timing and availability of food.		
Primary release sites on federal lands	Single initial release site based on habitat criteria.	Multiple release sites based on habitat criteria.	Same as alternative C.
Adaptive management phase release sites	Derived from spatial monitoring. Note: No additional releases beyond replacement during 2-year evaluation period in years 3 and 4.	Derived from spatial monitoring.	No adaptive management phase.
Habitat Security			
NCE grizzly habitat conservation (core habitat)	Maintain at least 70% of core habitat under management direction provided in the Ross Lake GMP (NPS 2012c). Maintain no net loss of core habitat for USFS under the 1997 interagency MOU until forest plans are revised.		
Management Tools	Note: Minimum requirements analysis pursuant to the *Wilderness Act* was conducted for actions that could occur in wilderness areas. See appendix F.		
Tools for capture of grizzly bears	Baited foot snares or culvert traps would be used to capture grizzly bears with possible helicopter support in wilderness or roadless areas. Also potential to evaluate and use helicopter-based capture darting.		
Release approach	Grizzly bears would be released from culvert traps transported by truck and/or from culvert traps ferried in by helicopter. Release sites would be remote. All release activities would be conducted by the FWS, NPS, and USFS, in consultation with WDFW.		
Helicopters and other remote access tools	Helicopters used for release and possibly retrieval of collars. Fixed-wing aircraft and satellites used for periodic monitoring. All release activities would be conducted by the FWS, NPS, and USFS in consultation with WDFW.		
Timing of Management Actions			
Initial and adaptive management releases	Early summer-early fall depending on release site (may have more latitude based on food availability). Release timing is food source dependent and may be limited by capture timing.		
Maintenance activities (monitoring activities, etc.)	Monitoring activities would take place from early spring to late fall and would be done in cooperation among the USFS, FWS, NPS, and WDFW.		

Element	Alternative B: Ecosystem Evaluation Restoration	Alternative C: Incremental Restoration	Alternative D: Expedited Restoration
Other Considerations			
RCW 77.12.035	As a result of the RCW, participation in active grizzly bear restoration by the WDFW would be subject to state authorization.		
Management actions across jurisdictions	Joint management under IGBC subcommittee. Monitoring would be accomplished through cooperation among FWS, NPS, USFS, and WDFW.		
Conflict grizzly bear management	Responses, including removal/relocation of human-conflict grizzly bears as necessary, would be based on updated 2002 IGBC Guidelines applicable to the NCE (appendix E) and could result in potential temporary, local closures (up to several days) for public safety. Additional modifications could be made in consultation with the IGBC NCE Subcommittee.		
Public access management	No long-term closures expected. Occasional short-term (a few hours to a few days) closures for releases and public safety may occur, but would be site-specific.		
Research and monitoring	Habitat use and spatial distribution monitoring and analysis to inform subsequent releases. Recapture work to maintain collared sample. Hair collection for genetic monitoring. Use of camera traps for monitoring. Includes activities to retrieve collars and bear mortalities.		
Public outreach and education/information	Increased efforts related to outcome of program with regular (initially weekly) updates on grizzly bear restoration efforts; includes education and outreach that are also common to the no-action alternative.		
Ungulate hunting management	Increased public outreach and education efforts for hunters to avoid grizzly bear encounters, increase use of bear spray, clean camping, etc.		
Black bear hunting management	Mandatory species identification training would be considered, additional grizzly bear information would be provided to all bear hunters, especially in areas within the recovery zone and areas immediately adjacent to the recovery zone that grizzly bears are likely to use (public outreach and education).		

ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER DETAILED ANALYSIS

The following alternatives were considered but dismissed from further analysis for reasons explained below.

Washington Only Restoration

As discussed in chapter 1, Washington law prohibits transplanting or introducing grizzly bears into the state, and permits WDFW to utilize only grizzly bears that are native to the State of Washington for management programs. In an effort to develop action alternatives that would be consistent with state law, the interagency planning team assessed the feasibility of a Washington only restoration alternative. Under this alternative, the NPS, FWS, USFWS, and WDFW would release grizzly bears into the U.S. portion of the NCE that had been sourced from other areas within the State of Washington. These areas would include the Washington portion of the SE and the Sheep Creek, or "Wedge," area of northeastern Washington, which is located between the Kettle and Columbia rivers and adjoins grizzly habitat in Canada. Grizzly bears would be released at a single release site to maximize the probability that they would encounter, interact with, and breed with one another.

During the primary phase of restoration, grizzly bears would be released into the NCE annually as their availability permits, with a goal of establishing an initial population of 25 grizzly bears. Given the low grizzly bear population in other areas of Washington, it is anticipated that no more than 1 to 2 grizzly bears could be captured and released into the NCE in a given year. In some years, grizzly bears may not be available for capture. The optimal sex ratio for grizzly bears released into the NCE would be 60% to 80% female and 20% to 40% male; however, because of the limited number of grizzly bears available, grizzly bears up to 10 years old could be targeted for capture and release. As a result, it is likely that the age and sex ratio of grizzly bears that would be sourced from areas in Washington State would depart from the optimal ratio.

The U.S. portion of the SE represents about 1,160 square miles; of this area only about 41% (or 475 square miles) is located in Washington with the remaining area located in Idaho. The overall population in the U.S. portion of the SE was last estimated to be 25 grizzly bears in 2012 (Proctor et al. 2012). Monitoring data suggest that less than 41% of these grizzly bears reside in Washington, while higher densities occur in Idaho (Kasworm et al. 2015). For assessing the feasibility of this alternative in meeting NCE population restoration goals, it was assumed that 40% of the SE grizzly bear population resides in Washington (possibly 10 grizzly bears). Of these 10 grizzly bears, approximately 33% (3 grizzly bears) are expected to be reproductive females (FWS 1993a). Female grizzly bears first reproduce at approximately 6 years of age, and produce a litter of 2 cubs every 3 years. Assuming no adult or cub mortality, these three female grizzly bears would likely produce a total of 2 cubs every third year. Assuming an even sex ratio, the 2 cubs would consist of 1 male and 1 female. If both cubs were used for restoration in the NCE, there would be no recruitment in the Washington portion of the SE, which would result in adverse impacts on the sustainability of the SE population. If only female cubs were used for restoration in the NCE, it would result in a lack of female recruitment and similar adverse impacts on the sustainability of the SE population (Kasworm pers. comm. 2016b).

The use of grizzly bears from the Washington portion of the SE would also require a decision that restoration of the NCE grizzly population was of higher priority than recovery of the SE population; however, even if that were the decision, the small number of candidate grizzly bears available for capture in a given year would not yield a sufficient number of bears within a biologically relevant time period to restore a grizzly bear population in the NCE. This alternative would not enhance the probability of long-

term survival of grizzly bears in the NCE, and thus would not meet the purpose and need of this draft plan/EIS and was dismissed from further analysis.

Delayed Implementation of Washington Only Restoration

The interagency planning team also considered an alternative that would release grizzly bears from the SE into the NCE; however, these efforts would be implemented only after it had been determined that recovery of the SE grizzly bear population had been achieved. With an estimated population of 75 bears in the SE, including the British Columbia portion, and an estimated growth rate of 1.8% (Wakkinen and Kasworm 2004), it would take at least 12 years to reach the SE population recovery goal of 90 bears. However, the *Grizzly Bear Recovery Plan* also indicates the need for the SE population to be linked to other populations, as evidenced by documented breeding activity and improvement in genetic diversity before the population is considered fully recovered (FWS 1993a). Additionally, a conservation strategy would need to be prepared and a final rule published before actions could be taken to translocate bears from the SE to the NCE. In aggregate, the steps outlined above could take decades.

Given the low population of grizzly bears in the SE, the very slow reproductive rate of the species, genetic concerns, and other logistical constraints described above, it is not considered likely that full recovery of the SE grizzly bear population could be achieved in sufficient time to avoid the permanent loss of grizzly bears that are present in the NCE. Since this alternative would not enhance the probability of long-term survival of grizzly bears in the NCE, and thus would not meet the purpose and need of this draft plan/EIS, it was dismissed from further analysis.

Natural Recovery

Comments received during public scoping requested that the agencies allow for restoration to occur naturally—allowing grizzly bears to return to the U.S. portion of the NCE on their own. This approach is characterized by the no-action alternative, described above. As noted in chapter 1, although a very small number of grizzly bears still inhabit the NCE, the number of grizzly bears in the NCE does not meet the accepted definition for a population (2 adult females with cubs or 1 adult female tracked through two litters) (FWS 2000a) and it is unlikely the small number of bears in the ecosystem is sufficient for a population to recover on its own. Additionally, the ecosystem is isolated from other ecosystems in the United States and Canada, making it highly unlikely that grizzly bears could migrate in from other populations. As a result, this alternative would not enhance the probability of long-term survival of grizzly bears in the NCE, and therefore would not meet the purpose and need of this draft plan/EIS. As a result, this alternative was dismissed from further analysis.

Ecosystem Restoration and Habitat Preservation Only

Comments received during public scoping requested that the agencies consider an alternative that would not involve the capture and release of grizzly bears into the NCE, but would focus solely on ecosystem restoration and habitat preservation, in an effort to facilitate more movement of grizzly bears into the U.S. portion of the NCE from the British Columbia portion and to increase habitat use by grizzly bears in the U.S. portion of the NCE. Ecosystem restoration and habitat preservation actions could consist of elements including, but not limited to, protecting meadows, prohibiting clear cutting and salvage logging, restoring salmon habitat, and improving connectivity with grizzly bear habitat in British Columbia. As discussed in chapter 1, scientific research indicates that habitat within the NCE is currently capable of supporting a self-sustaining grizzly bear population (FWS 1997). The primary constraints on grizzly bear restoration in the NCE are related to the small number of grizzly bears, the particular characteristics of the species' reproductive biology, and the isolation of the NCE from other grizzly bear populations in both the United

States and Canada. This alternative would not address the key constraints of restoring a grizzly bear population in the NCE and thus would not meet the purpose and need of this plan and was dismissed from further analysis.

Social Tolerance-Based Grizzly Bear Restoration

Comments received during public scoping requested that the agencies consider an alternative that would focus on a very slow grizzly bear restoration process, based on social tolerance of grizzly bears within communities in and surrounding the NCE. This approach would involve releasing only one to two grizzly bears into the ecosystem each year. The goal of this alternative would be to allow residents of the NCE the time and opportunity to become comfortable with the notion of living with grizzly bears in the ecosystem. As discussed above under the dismissal rationale for the Washington-only restoration alternative, the release of only one to two individuals in the NCE per year would not yield a sufficient number of bears within a biologically relevant period to restore a grizzly bear population in the NCE. This alternative was eliminated from further analysis because it would not be feasible to achieve the described restoration goals based on the limited number of grizzly bears released and would thus not meet the purpose and need of this draft plan/EIS. Instead, the agencies have developed alternative B, Ecosystem Evaluation Restoration, under which fewer grizzly bears would be released over the first 2 years of the plan to monitor grizzly bear movements and any potential human use conflicts prior to full implementation of grizzly bear restoration. Alternative B would allow residents of the NCE to become more comfortable living with grizzly bears again, with full restoration likely taking more than six decades depending on results of monitoring information and subsequent decisions.

Section 10(j) Population with Citizen Management

The interagency planning team considered an alternative that would include restoration of grizzly bears as a 10(j) experimental, nonessential population with citizen management. Under this alternative, a Citizen Management Committee would be authorized to have management implementation responsibility for the NCE grizzly bear experimental population. The Citizen Management Committee would implement the North Cascades chapter of the FWS *Grizzly Bear Recovery Plan* as consistent with an ESA section 10(j) final rule for the establishment of a nonessential experimental grizzly bear population in the NCE. As discussed above, all of the action alternatives considered in this draft plan/EIS include an option to manage grizzly bears in the NCE under a 10(j) rule. Alternatives that delegate management implementation responsibility to a citizen committee have been considered in other NEPA documents and have been successfully challenged in court based on over-delegation of federal authority to a local group of citizens who are not federal employees (*National Parks and Conservation Association. v. Stanton*, 54 F. Supp. 2d 7 (D.D.C. 1999)). As a result, evidence exists for a legal precedent against the use of citizen management in implementing grizzly bear restoration actions. This alternative was therefore deemed not to be feasible and was dismissed from further analysis. However, all of the action alternatives being considered would include the dissemination of information related to the progress of the grizzly bear restoration effort. Additionally, all of the alternatives considered could be implemented pursuant to the development of a 10(j) rule.

Capture and Release of Healthy, Young Females Only

Comments received during public scoping requested that the agencies consider an alternative that would release only healthy young female grizzly bears into the NCE. The age and sex demographics of grizzly bears present within the NCE are unknown; however, it is generally accepted that the number of grizzly bears present in the NCE is extremely small. It is not anticipated that the number of male grizzly bears currently present in the ecosystem is sufficient to ensure a reasonable probability of interaction and breeding with females that are released into the ecosystem. Therefore, this alternative would not meet the purpose and need of this plan, and was therefore dismissed from further analysis.

Chapter 3:

AFFECTED ENVIRONMENT

CHAPTER 3: AFFECTED ENVIRONMENT

INTRODUCTION

The "Affected Environment" chapter describes existing conditions for those elements of the human environment (physical, natural, cultural, and socioeconomic) that would be affected by implementing the actions considered in this *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (draft plan/EIS). Grizzly bear restoration actions proposed in this draft plan/EIS would be applied within the roughly 6.1 million acre North Cascades Ecosystem (NCE) grizzly bear recovery zone as described in the NCE chapter of the U.S. Fish and Wildlife Service (FWS) *Grizzly Bear Recovery Plan* (FWS 1997). The recovery area is made up of 85% federal land; therefore, the discussion of the affected environment primarily focuses on those resources that may be affected within the North Cascades National Park Service Complex (park complex), Okanogan-Wenatchee National Forest, and Mt. Baker-Snoqualmie National Forest. In addition to the NCE grizzly bear recovery zone, bears that move outside the primary restoration area could be subject to additional management depending on the regulatory provisions in the *Endangered Species Act* (ESA) section 10(j) experimental population designation, if such a designation is made. It is difficult to predict where bears might move; therefore, areas outside the NCE are described generally for resources that could be affected by bear movements and behavior or associated management actions.

GENERAL PROJECT SETTING

The NCE constitutes a large block of contiguous habitat that spans the international border but is isolated from grizzly bear populations in other parts of the United States and Canada. The U.S. portion of the ecosystem is bounded roughly by the Okanogan Highlands and Columbia Plateau on the east, Snoqualmie Pass to the south, the Puget lowlands to the west, and the Canadian border to the north (figure 3). As noted above, roughly 6.1 million acres within the NCE is designated as the NCE grizzly bear recovery zone (FWS 1997). The recovery zone encompasses all of the park complex, which makes up 11% of the recovery zone, along with most of Okanogan-Wenatchee National Forest and Mt. Baker-Snoqualmie National Forest, which together make up 74% of the recovery zone. Private lands account for an additional 10% of the recovery zone, while state lands make up the remaining 5% (figure 3). References to the NCE in this draft plan/EIS apply specifically to the NCE grizzly bear recovery zone unless otherwise noted.

The park complex encompasses 680,925 acres of public land within the NCE, including 501,115 acres within North Cascades National Park, 116,867 acres within Ross Lake National Recreation Area, and 62,907 acres within Lake Chelan National Recreation Area. The park and the two national recreation areas are managed jointly as the nation's only National Park Service (NPS) complex. Elevations within the park range from about 350 feet to over 9,000 feet (NPS 2007a). The landscape is characterized by rugged topography consisting of glaciated peaks interspersed with numerous stream and riverine systems. Vegetation ranges from alpine tundra in the higher elevations to dense forest in the lower elevations.

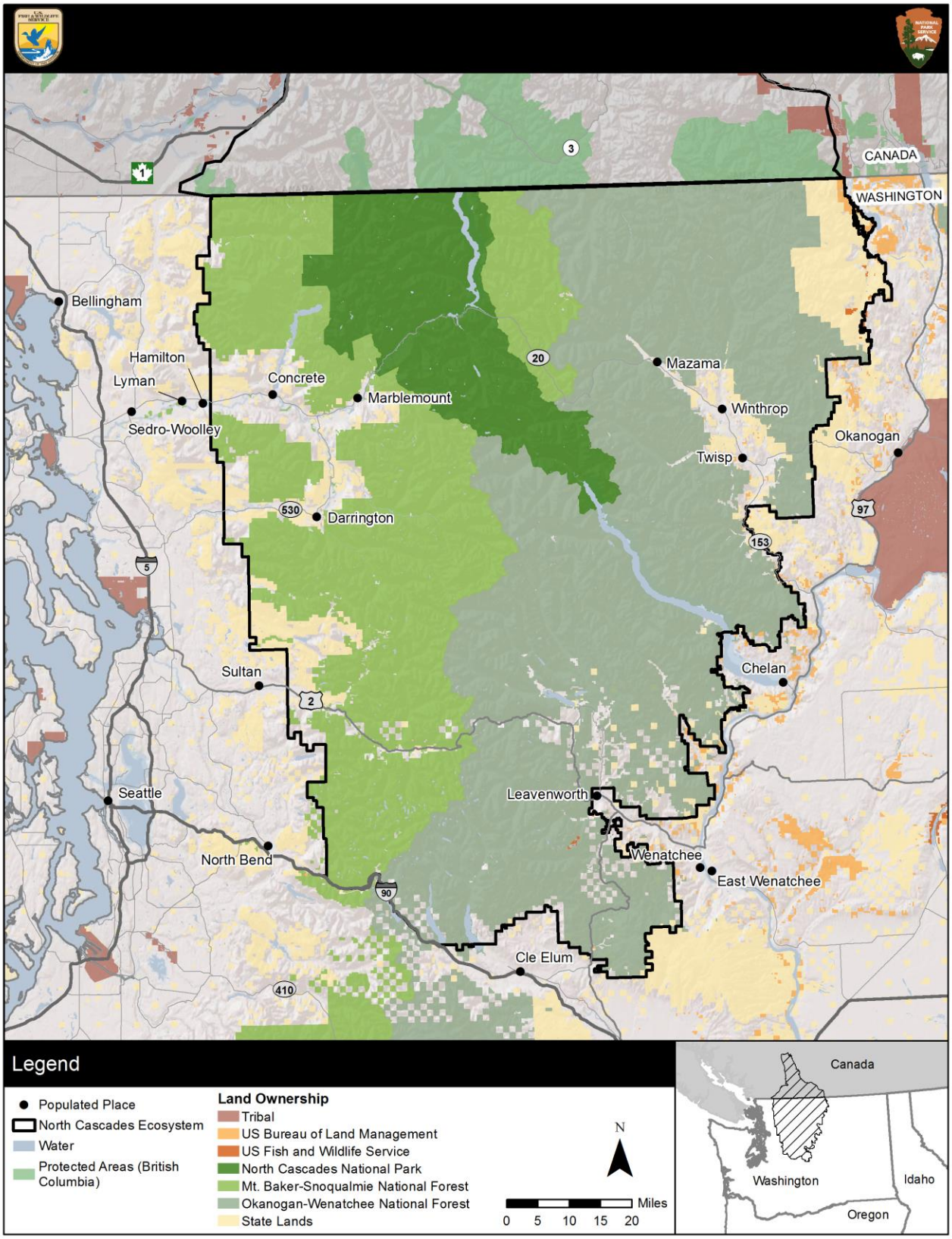

FIGURE 3. NORTH CASCADES ECOSYSTEM

The park complex shares boundaries with Okanogan-Wenatchee National Forest and Mt. Baker-Snoqualmie National Forest, whose lands make up approximately 74% of the NCE, as well as provincial parks and Crown lands to the north in British Columbia. Okanogan-Wenatchee National Forest encompasses more than 4 million acres on the east side of the Cascade Crest and stretches south from the Canadian border to the Goat Rocks Wilderness—a distance of about 180 miles. The eastern edge of the forest extends into the Okanogan highlands, south along the Okanogan and Columbia Rivers, and to the Yakima River valley. Because of this wide geographic range, the forest is very diverse, extending from high, glaciated alpine peaks along the Cascade Crest through heavily forested areas, to arid shrub-steppe at its eastern edge. Elevations range from below 1,000 feet to over 9,000 feet (USFS 2016h). Mt. Baker-Snoqualmie National Forest encompasses 1,724,229 acres on the west side of the Cascade Crest, extending south 140 miles from the Canadian border to the northern boundary of Mount Rainier National Park. The forest ranges from under 100 feet in elevation to over 10,000 feet, extending from glaciated alpine peaks along the Cascade Crest through alpine meadows and lakes to lower-elevation old growth mixed-conifer forest (USFS 2016i).

Over 94% of the park complex is part of the legislatively designated Stephen Mather Wilderness (NPS 2012b). To the east of the park complex, Okanogan-Wenatchee National Forest includes two wilderness areas: Pasayten Wilderness Area that runs along the eastern boundary of Ross Lake National Recreation Area and Lake Chelan-Sawtooth Wilderness Area, which is adjacent to the eastern boundary of Lake Chelan National Recreation Area. Glacier Peak Wilderness Area, which encompasses parts of Okanogan-Wenatchee National Forest and Mt. Baker-Snoqualmie National Forest, adjoins most of the southern boundary of Lake Chelan National Recreation Area and the South Unit of North Cascades National Park. Mt. Baker-Snoqualmie National Forest extends along the western boundary of the park complex and includes two other wilderness areas: the Noisy-Diobsud Wilderness (situated between North Cascades National Park and Baker Lake) and the Mount Baker Wilderness farther north. These two wilderness areas are adjacent to parts of the north unit of North Cascades National Park (NPS 2008a). The Henry M. Jackson and Wild Sky Wilderness areas adjoin the Glacier Peak Wilderness on the southwest. Two other wilderness areas, the Alpine Lakes Wilderness and the Boulder River Wilderness, make up an additional 0.4 million acres of wilderness that are not contiguous with the areas listed above. The Stephen Mather Wilderness, in combination with adjacent U.S. Forest Service (USFS) wilderness areas, constitutes over 2.2 million acres of contiguous wilderness. This is the largest block of designated wilderness in the state of Washington and one of the largest in the contiguous 48 states (NPS 2012b).

WILDLIFE AND FISH

Management actions associated with grizzly bear restoration activities could impact other wildlife species as a result of the use of aircraft or other vehicles and equipment during release and subsequent monitoring of grizzly bears. Certain wildlife and fish species could be affected by the presence of grizzly bears in the ecosystem as a result of predation or competition for resources. Wildlife and fish species present in the NCE that could be affected, including special-status species, are described on the following pages.

Grizzly Bears

Population Status

The grizzly bear (*Ursus arctos horribilis*) is federally listed under the ESA as "threatened" in the NCE, although the most recent review of its status indicated that uplisting this population to "endangered" was warranted but precluded by higher priority listing actions (FWS 2016a). That review also found that a population of grizzly bears may no longer exist in the NCE and that active restoration may be used to reestablish a population (FWS 2016a). The grizzly bear is listed as "endangered" by the State of

Washington. The FWS, in its environmental impact statement (EIS) for grizzly bear recovery in the Bitterroot Ecosystem (BE), defines a minimal existing grizzly bear population in the following way:

> a grizzly bear population is defined by verified evidence within the previous 6 years, consisting of photos within the area, verified tracks and/or sightings by reputable scientists or agency personnel, of at least two different female grizzly bears with young or one female seen with different litters in two different years in an area geographically distinct from other grizzly bear populations. Verifiable evidence of females with young, to be geographically distinct, would have to occur greater than 10 miles from the nearest non-experimental grizzly bear population recovery zone boundary (FWS 1993a).

Research from the Cabinet-Yaak Ecosystem (CYE) of northwest Montana and northern Idaho indicates the average home range size of an adult female grizzly bear, when converted to a circle, has a radius of approximately 10 miles (Kasworm and Servheen 1995).

Photo Credit: Dave Molenaar

Foraging grizzly bear

There have been few confirmed sightings of grizzly bears in recent decades in the NCE on either side of the international border. The most recent confirmed observation within the U.S. portion of the NCE was in 1996, south of Glacier Peak (IGBC NCE Subcommittee pers. comm. 2016). The only direct evidence of reproduction during the past 25 years was a confirmed observation of a female and cub on upper Lake Chelan in 1991 (Almack et al. 1993). Efforts to obtain grizzly bear hair samples during 1998 (BC Ministry of Environment, cited in Romain-Bondi et al. 2004), 1999–2000 (Romain-Bondi et al. 2004) and 2010–2012 (Long et al. 2013) detected only 1 female grizzly bear. Approximately 23% of the U.S. portion of the NCE was sampled, along with parts of the British Columbia border parks. Surveys focused on remote sites within high quality grizzly bear habitat. During 2010 and in 2012, a grizzly bear (most likely the same individual) was detected at a site in Manning Park, British Columbia, by a remote camera designed to lure wolverines for research purposes. This site was less than 20 miles north of the international border. Hair samples confirmed it as a male grizzly bear. During 2015 a series of photographs of a grizzly bear were taken roughly 10 miles north of the border and approximately 19 miles east of the 2010 sighting. No accompanying hair samples were collected; therefore, it is unclear if this grizzly bear was the same individual detected in 2010 and 2012 (Hamilton pers. comm. 2016b). These are the only detections of grizzly bears in the NCE during the past 10 years. Based on the information gathered to date in the NCE, there is no evidence to support the conclusion that there is a population of grizzly bears in the ecosystem, as defined above.

Historical Population. The NCE historically supported a substantial grizzly bear population, according to records compiled by Bjorklund (1980), Sullivan (1983), Almack et al. (1993), and others. Bjorklund (1980) summarized and mapped 16 historical (prior to 1950) and 14 recent (1950–1980) grizzly bear observations in the NCE; however, he did not distinguish between confirmed and unconfirmed observations. More reliable results come from Sullivan (1983), who interviewed 346 people claiming to observe grizzly bears in the NCE. He estimated that the sum of these attestations amounted to approximately 100 individual human-grizzly bear encounters spanning 130 years. At the height of the fur

trade from 1820 to 1860, the Hudson's Bay Company documented 3,788 grizzly bear hides shipped from trading posts in the North Cascades region, and the last documented grizzly bear killed in the area was shot in Fisher Creek in 1967 (Sullivan 1983). In addition to records of pelts, other evidence of historical grizzly bear presence in the NCE is found in writings about Native Americans, early USFS history, and the archaeological record (Underhill 1945). Lastly, five Holocene archaeological sites in eastern Washington have produced grizzly bear remains that could be evidence of prehistoric grizzly populations in the nearby mountains of the NCE (Lyman 1986). These earlier accounts indicate that grizzly bears existed historically throughout the Cascade Mountains and likely inhabited the coastal regions of Washington and Oregon (Almack et al. 1993).

Current Bear Numbers. To estimate the current number of grizzly bears in the NCE, scientists have relied on statistical analyses of data obtained from a variety of field techniques. During an evaluation of the NCE from 1986–1991, Almack and others confirmed resident grizzly bears in the NCE using a combination of documented observations, live capture surveys, and self-activated camera surveys (Almack et al. 1993). While the live capture and self-activated camera surveys yielded no grizzly bears, the documented observations that were considered to be "confirmed" or "highly reliable" suggested that at the time of the study, the NCE harbored a small number of grizzly bears.

As discussed above, no confirmed grizzly bear observations have been documented in the U.S. portion of the NCE since 1996, although a few grizzly bear occurrences have been verified in the Canadian portion of the NCE during the same time period. Although few grizzly bears have been directly detected by biologists, Romain-Bondi and others (2004) estimated the relative density and population size of grizzly bears in a 1,448 square mile study area (11% of the entire ecosystem) through DNA hair-sampling techniques and a comprehensive statistical analysis of regional and national grizzly bear datasets. Using data from the NCE and six other grizzly bear management areas, they developed a series of regression models relating catch per unit effort to density. The model that best fits the data estimated densities between 0.03 and 0.71 grizzly bears per 38.6 square miles, with a mean estimate of 6 grizzly bears for the study area (90% CI: 3-11). However, their regression models included only a single grizzly bear detection in the NCE, about 15 miles north of the border in British Columbia, relative to catch per unit effort in two other ecosystems with low grizzly bear population densities.

Habitat Suitability

The first iteration of the FWS *Grizzly Bear Recovery Plan*, published in 1982, identified the need to evaluate the NCE to determine its suitability as a grizzly bear recovery area. Almack et al. (1993) initiated the 5-year ecosystem evaluation in 1986 (FWS 1993a). Four studies have evaluated portions of the NCE for grizzly bears (Agee et al. 1989; Almack et al. 1993; Gaines et al. 1994; Lyons et al. 2016). These studies all conclude that the NCE has suitable habitat essential for the maintenance of a grizzly bear population.

Habitat Studies. Agee et al. (1989) used geographic information system (GIS) software to compare historical grizzly bear sightings to land cover types in their study area to determine which land cover types grizzly bears prefer (table 3). Their results showed that grizzly bear sightings were positively correlated with whitebark pine (*Pinus albicaulis*), subalpine larch (*Larix lyallii*), and subalpine cover types, inferring that these are the preferred habitat types of grizzly bears. However, it should be noted that these relatively open habitat types offer better visibility than most, which could have biased the sighting database; it must also be noted that whitebark pine is not a common habitat type throughout the NCE and may not be as important for grizzly bears in this ecosystem as it is in others where it is more prevalent (IGBC NCE Subcommittee pers. comm. 2016). The Interagency Grizzly Bear Committee (IGBC) NCE Subcommittee had two separate research teams (Almack et al. 1993; Gaines et al. 1994) evaluate an area encompassing over 10,000 square miles of the NCE for suitable grizzly bear habitat. The survey area

included all of the park complex and most of Mt. Baker-Snoqualmie and Okanogan-Wenatchee National Forests. Each team evaluated the survey area for viable grizzly bear habitat using common criteria including the presence, abundance and diversity of grizzly bear foods; habitats of seasonal importance and their distribution; and delineation of human activities (i.e., roads, habitation, timber harvest, recreation, etc.). In addition to these criteria, Almack et al. (1993) evaluated the study area for grizzly bear habitat according to the seven characteristics identified by Craighead, Sumner, and Scaggs (1982): space, isolation, denning, safety, sanitation, vegetation types, and food.

The results of these surveys were presented to a technical review team, which ultimately determined based on the available data that the NCE could support a viable grizzly bear population of 200 to 400 individuals (Servheen et al. 1991). More recent work has estimated a mean carrying capacity for grizzly bears in the NCE between 250 and 300 grizzly bears using a suite of spatially explicit, individual-based population models that integrate information on habitat selection, human activities, and population dynamics (Lyons et al. 2016). Table 3 shows habitat rankings recommended by the IGBC NCE Subcommittee (2001) for use in the evaluation of core areas in grizzly Bear Management Units (BMUs) in the NCE.

Photo credit. A. Braaten

Potential grizzly bear habitat in Park Creek Valley

TABLE 3. RECOMMENDED HABITAT RANKINGS FOR USE IN THE EVALUATION OF CORE AREAS IN GRIZZLY BEAR MANAGEMENT UNITS IN THE NORTH CASCADES ECOSYSTEM

Ranking	Early Season	Late Season
Highest Priority	Montane meadow*	Alpine/subalpine meadow[a, b]
	Shrubfield [a]	Shrubfield [a]
	Deciduous forest[a]	Wet forest open [a]
	Riparian forest[b]	Montane meadow[a]
	Wet forest opening	High elevation forest
	Dry forest	Riparian forest
	High elevation forest	Dry forest open
	High elevation forest open	Deciduous forest
	Wet forest	Wet forest
	Alpine/subalpine meadow	Dry forest
	Low elevation shrub/herb	High elevation forest open
Lowest Priority	Dry forest open	Low elevation shrub/herb

Source: IGBC NCE Subcommittee 2001

[a] Indicates vegetation types that were used significantly more than others.

[b] Indicates vegetation types that were moved higher on the priority list based on differences between grizzly bear and black bear habitat use.

Foods and Vegetation Types. Munro et al. (2006) described the general pattern of foraging by grizzly bears in west-central Alberta. Upon emergence from dens in early spring, grizzly bears dig for roots before beginning to hunt ungulates in late May and early June. Avalanche chutes, common on the west side of the Cascades, have been identified as important spring food sources for grizzly bears in a number of studies (McLellan and Hovey 2001; Waller and Mace 1997; Ramcharita 2000; Serrouya et al. 2011). Avalanche chutes provide spring and summer forage species as well as potential avalanche mortalities (carrion) in the spring (Waller and Mace 1997). As herbaceous vegetation begins to green up, the predominant food items include grass-like plants and forbs. Grizzly bears shift to eating berries as they become available later in the summer. At the end of the berry producing period, grizzly bears again shift to consuming roots and ungulates prior to reentering their dens (McLellan and Hovey 2001).

Photo Credit: Matthew Rochetta

Grizzly bear foraging in regenerating forest

Kasworm et al. (2014) presented grizzly bear food data from the CYE, which has a Pacific maritime climate and may be indicative of potential grizzly bear food habits in the central and west side of the Cascade Mountains. Huckleberry (*Vaccinium* spp.) appears to be an important component of diet. Data were collected over several years, using both isotope analysis on hairs and scat. Isotope analysis showed a highly variable use of meat (8% to 97% of diet), while meat was found in many scats in some months (40% of dry matter in April and May) including fall (carrion). Overall, mammals and shrubs (berries) constituted 64% of total dry matter annually. In a diet study of grizzly bears in several western ecosystems, researchers found that adult male grizzly bears were more carnivorous than any other age or sex class, with diets composed of around 70% meat (Jacoby et al. 1999). Other sex and age groups of grizzly bear displayed diets similar to black bears living in the same areas reflective of diets described by Kasworm et al. 2014 (Jacoby et al. 1999).

Almack et al. (1993) and Gaines et al. (1994) used Landsat multispectral scanner imagery and field observations to produce vegetation cover maps of the study area according to vegetation structure (e.g., forest, shrub, barren rock, etc.) and community composition. The teams also identified 124 plant species known to be grizzly bear foods through an exhaustive review of sighting reports, scat analysis, and studies conducted on grizzly bears south of Alaska. Analysis of the vegetation maps indicated that 100 of the 124 identified plant species exist in the study area, and every vegetation cover type contained some plants that were on the list. The teams also mapped ranges of wildlife prey species known to occur in the study area. Salmonid species were more abundant in streams on the western slope of the NCE and ungulates were dispersed relatively evenly throughout the study area. These results led both teams to conclude that sufficient vegetative grizzly bear foods are readily available in the NCE, and the occurrence of wildlife prey species can sustain a grizzly bear population (Almack et al. 1993; Gaines et al. 1994).

Grizzly Bear Source Populations

Basic criteria for grizzly bear source populations would require populations to be located in areas with a similar food economy to the NCE. Additionally, these populations must be large and stable enough that they would have the ability to sustain the loss of individuals. Source populations likely to supply grizzly bears for release include populations in south-central British Columbia, Canada and in the Northern Continental Divide Ecosystem (NCDE) (see figure 4).

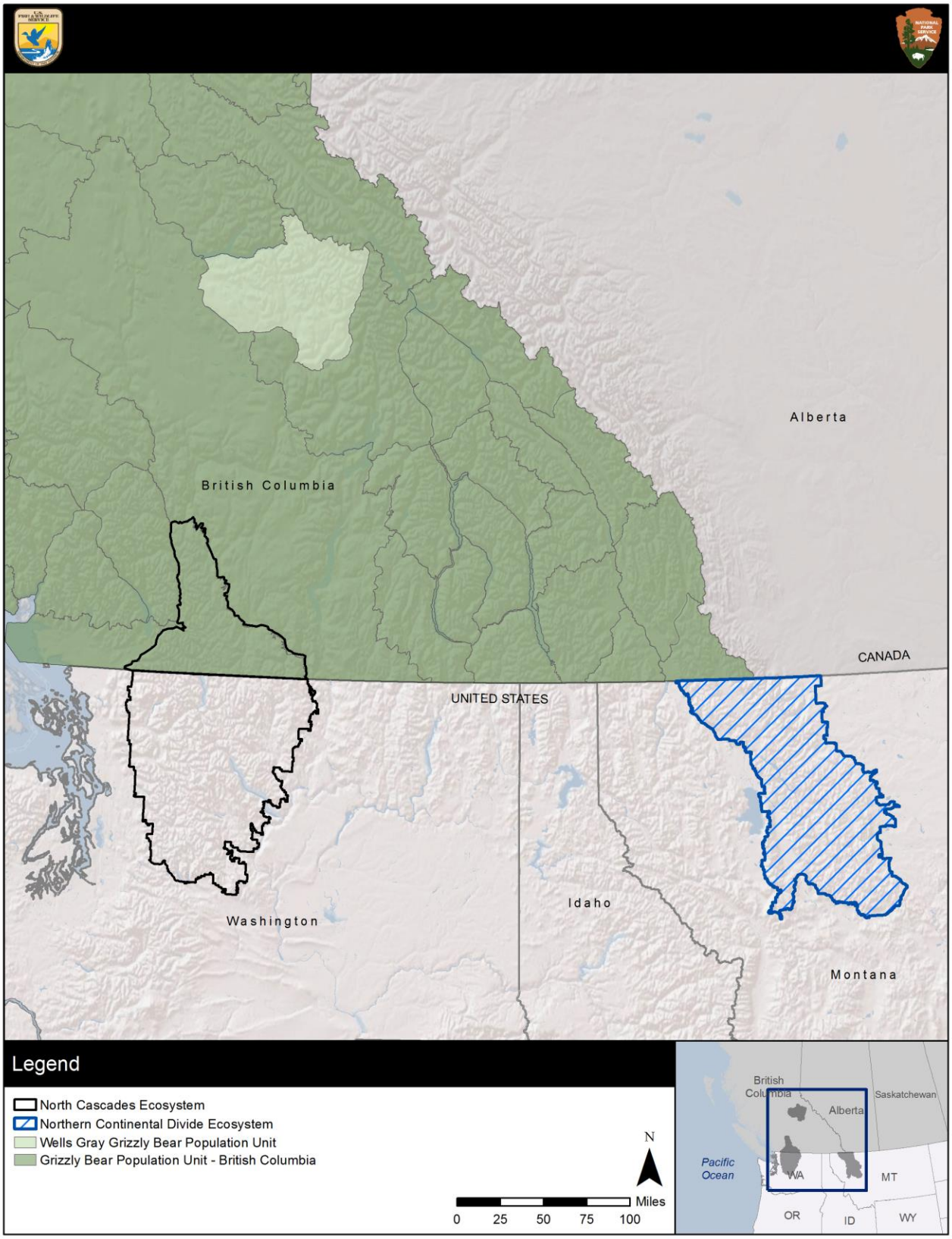

FIGURE 4. LIKELY GRIZZLY BEAR SOURCE POPULATIONS

South-Central British Columbia. In 2012, there were approximately 15,000 grizzly bears in British Columbia (MFLNRO 2012). The current range of grizzly bears in British Columbia has been divided into 56 grizzly bear population units (GBPUs) that delineate individual grizzly bear populations for conservation and management (MFLNRO 2012). GBPU boundaries at the edges of grizzly bear distribution in the province represent the "occupied/unoccupied" line. This line was drawn to reflect the known and predicted distribution of resident adult females. Transient males, particularly subadults, are occasionally sighted in unoccupied areas. However, these lines are the expected limits of areas regularly inhabited by grizzly bears. They are also used for setting land-use priorities during strategic land-use planning. Each GBPU has been assigned a conservation status of either Threatened or Viable. The objective for the nine Threatened GBPUs in British Columbia is population recovery to prevent range contraction and ensure long-term population viability. The objectives for the remaining 47 viable GBPUs includes maintaining current population abundance and distribution, and providing sustainable harvest and viewing opportunities where appropriate.

One of the potential source areas for grizzly bears is the Wells Gray region of British Columbia. This region includes nine protected areas in the Cariboo Mountains and Shuswap Highlands located in the northern Columbia Mountains. These protected areas create the fifth largest system of contiguous protected area in British Columbia (MacHutchon 2004). This area is entirely within the Fraser River watershed, and the interior wet-belt ecosystems contains a variety of wildlife and fish; however, bears do not have access to Pacific salmon. Habitat types include valley bottom riparian corridors; lakes and rivers; avalanche chutes; wetlands; alpine and subalpine areas; and old growth spruce, hemlock, cedar, fir and pine forests (MacHutchon 2004). The habitat is largely unfragmented with few roads.

Wells Gray and Trophy Mountain parks are both closed to grizzly bear hunting. In 2012, they were estimated to support a population of 317 grizzly bears (MFLNRO 2012). The agencies assumed that 20%–30% of the bear population is subadult, which equates to approximately 28–43 subadult bears in any given year. Wells Gray Park is ecologically most similar to the NCE. Both areas contain large amounts of Englemann Spruce-Subalpine Fir areas, which seem to be more productive in terms of food in the NCE. This suggests that the release sites would have the same or more available food than the source area. The capture and relocation of grizzly bears from this area is consistent with its overall management that expressly supports it so long as the population is able to withstand the reduction in population.

Northern Continental Divide Ecosystem. As described in chapter 1, the NCDE includes the Bob Marshall Wilderness Complex and Glacier National Park in northwestern Montana, and adjacent areas in Canada. The NCD recovery zone encompasses approximately 9,600 square miles of northwest Montana (Dood, Atkinson, and Boccadori 2006). The NCDE extends south from Canada, west into the Flathead and Mission valleys, and east to the Rocky Mountain Front. Approximately 90% of the recovery zone is in federal, tribal, or state ownership, with only 10% on private lands (Dood, Atkinson, and Boccadori 2006). However, the majority of bear-human conflicts and bear mortality occur on private lands. Grizzly bears in the NCDE occupy approximately 14,500 square miles of habitat that includes Glacier National Park, parts of the Flathead and Blackfeet Indian Reservations, parts of five national forests (Flathead, Helena, Kootenai, Lewis and Clark, and Lolo), Bureau of Land Management lands, and a large amount of state and private lands (Dood, Atkinson, and Boccadori 2006). However, Glacier National Park serves as the center of the population. Glacier National Park, as a largely undisturbed core of the larger ecosystem, contains many areas accessible only by foot or horse (NPS 1999). The area is characterized by extremely diverse habitats, much of it being heavily forested, mountainous, and a largely roadless wilderness and similar food economy as the NCE.

The grizzly bear population in this ecosystem numbers approximately 1,000 animals and continues to grow each year with an average rate of increase of approximately 3% (FWS 2015a; Costello et al. 2016). Grizzly bear population densities are estimated in Glacier to be approximately 30 bears per 386 square

miles, similar to reports from the Wells Gray area of British Columbia (Kendall et al. 2008). Grizzly bears in the NCDE also primarily eat plant matter, with adult and subadult females eating 100% and 94% plant matter, respectively, whereas 66% of a male bear's diet was plant matter (Jacoby et al. 1999).

The NCDE is managed based on a zoning approach. The primary conservation area is managed as a source area where the objectives are continual occupancy by grizzly bears and maintenance of habitat conditions that are compatible with a stable to increasing grizzly bear population. The objective in Zone 1 is continual occupancy by grizzly bears, but at expected lower densities than inside the primary conservation area. Together, the primary conservation area and Zone 1 comprise the area within which population data are collected and sustainable mortality limits apply.

In Management Zone 2, the objectives are to maintain existing resource management and recreational opportunities and allow agencies to respond to demonstrated conflicts with appropriate management actions. Public lands in Zone 2 are managed to provide the opportunity for grizzly bears, particularly males which are more likely to disperse long distances, to move between the NCDE and adjacent ecosystems. Conflict grizzly bears would only be removed from the NCDE by management as a last resort.

Management Zone 3 primarily consists of areas where grizzly bears do not have sufficient suitable habitat for long-term survival and occupancy. Management emphasis is on conflict response.

Other Wildlife and Fish

Mammals

Seventy-five mammal species in 21 families are found in the North Cascades. This section focuses on those species that may be affected by the restoration of grizzly bears or the activities necessary for their restoration.

Predator-Prey Interactions. Grizzly bears are omnivores that primarily feed on vegetation (FWS 2011a); however, they do have the potential to affect prey species in the NCE. A grizzly bear's diet consists of about 90% vegetable and insect matter; however, they scavenge and occasionally prey on ungulates in addition to ground-dwelling rodents that they actively dig out of dens or burrows. Research has documented the importance of local concentrations of ungulates as a potential source of protein for grizzly bears (IGBC 1987). In many locations, animal matter may not constitute a major annual diet item, but may be seasonally significant to grizzly bears (Mattson, Blanchard, and Knight 1991; Gunther and Haroldson 1998).

Photo credit: A. Braaten

Female deer with fawns near Stehekin in North Cascades National Park

Several species of ungulate occur in the NCE, including mule deer (*Odocoileus hemionus*), black-tailed deer (*Odocoileus hemionus columbianus*), mountain goats (*Oreamnos americanus*), bighorn sheep (*Ovis canadensis*), elk (*Cervus elaphus*), and moose (*Alces alces*). Mule deer and black-tailed deer numbers have declined somewhat since the historic highs in the mid twentieth century, but populations in the ecosystem remain robust. In more recent decades, populations have fluctuated largely in response to

winter severity but have remained relatively stable over the last 15 years. On the east slope of the Cascades in Okanogan, Chelan, and Northern Kittitas counties, the state estimated the mule deer population in 2015 at approximately 47,000 animals (WDFW 2016a). The total deer population in the NCE east of the Cascade crest likely exceeds 50,000 when white-tailed deer numbers in Okanogan and Chelan counties are added (Fitkin pers. comm. 2016). Deer numbers on the west side of the Cascades are lower, but still significant.

Mountain goat populations have declined relative to estimated historic levels. Estimates of the state population number approximately 2,815 animals, with about 635 goats within the NCE (Rice 2012). Bighorn sheep populations are generally stable in the NCE. The ecosystem and immediately adjacent wildlands support approximately 1,000 sheep in 6 herds spread along the eastern edge of the ecosystem (WDFW 2016b).

After successful augmentation in 1946, 1948, and between 2003 and 2005 from eastern and western Washington, the North Cascade elk herd peaked at about 1,400 to 2,000 elk in 1984 and then sharply declined to around 1,300 elk in 2002 (WDFW 2002). WDFW currently estimates the elk herd between 1,170 and 1,379 animals, an increase of 5%–7% annually (WDFW 2016a). The Colockum elk herd inhabits the southern portion of the NCE and in 2013 had an estimated population of 5,700 individuals (WDFW 2013b). Currently, WDFW estimates the Colockum elk herd to be between 5,500 and 6,500 animals (WDFW 2016a).

Moose in Washington colonized the northeastern portion of the state from neighboring British Columbia and Idaho. Moose were undocumented in Washington prior to the 1930s and were rare prior to the 1960s. Moose had become resident in northeastern Washington by the 1970s; the first hunts occurred in the 1970s. While moose populations are now well established in the NCE and likely increasing in number, no population estimates are currently available for this area (WDFW 2015).

Other potential prey include marmots, pika, and ground squirrels. Hoary marmots (*Marmota caligata*) are common in subalpine and alpine habitats, whereas pikas (*Ochotona* spp.) are common on mid to high elevation talus slopes (NPS 2016a), and Columbian ground squirrels (*Urocitellus columbianus*) are locally abundant in mid to upper elevation open meadows in the northeast portion of the NCE (Fitkin pers. comm. 2016).

Interspecific Competition. Some species of predator in the NCE may compete with grizzly bears for prey or other resources. The species most likely to compete or interact with released grizzly bears include gray wolf (*Canis lupus*), coyote (*Canis latrans*), fisher (*Martes pennanti)*, Canada lynx (*Lynx canadensis*), cougar (*Puma concolor*), bobcat (*Lynx rufus*), and black bear (*Ursus americanus*) (NPS 2016a).

The gray wolf was once present in North America from coast to coast, as far north as Alaska and south to Mexico until it was nearly brought to extinction in the lower 48 states by the 1930s. The species was listed as endangered under the ESA in 1973 (FWS 2015b). Currently it is listed as endangered in the state of Washington and federally listed in the western two-thirds of Washington (Wiles, Allen, and Hayes 2011). Wolves in the eastern portion of the state were delisted as part of the Northern Rocky Mountain Distinct Population Segment. Washington's first resident pack since the 1930s was documented in Okanogan County in 2008 (Becker et al. 2016). At the end of 2015, at least 90 wolves existed in 18 known packs in Washington, 3 of which occupy portions of the NCE. The 18 packs ranged in size from 2 to 8 individuals, with an average of 4.4 wolves per pack. Wolves in Washington continue to inhabit both public and private lands from eastern Washington to the east slopes of the Cascade Mountains, with occasional individuals documented west of the Cascade Crest (Becker et al. 2016).

Wolves are social pack animals that live in a variety of habitats. They are opportunistic carnivores, although they tend to focus on large ungulates like deer, elk, and moose (Wiles, Allen, and Hayes 2011). However, wolves also prey on smaller animals and use carrion. Interspecific competition with grizzly bears has been documented typically associated with prey (i.e., carrion), although wolves have been documented preying on grizzly bear cubs in Yellowstone National Park (Gunter and Smith 2004).

Coyotes are opportunists, both as hunters and scavengers. In Washington, coyotes occupy almost every habitat type from open ranch country to densely forested areas to urban environments. Despite ever-increasing human encroachment and past efforts to eliminate coyotes, the species maintains its numbers and is increasing in some areas. Coyotes eat any small animal they can capture, including mice, rats, gophers, mountain beavers, rabbits, and squirrels, as well as snakes, lizards, frogs, fish, birds, and carrion. They eat some Grass, fruits, and berries during summer and fall. Natural predators of coyote include cougars, bears, and other coyotes (WDFW 2004).

Fishers are medium-sized carnivores in the weasel family that inhabit a variety of forest types, although they commonly use landscapes that are dominated by mid- and/or late-successional forests (Lofroth et al. 2010). Fishers commonly prey on small and mid-sized mammals including mice, voles, shrews, squirrels, snowshoe hares, mountain beavers, and porcupines (Martin 1994; Weir et al. 2005). Fishers frequently use cavities in large live trees, large snags, and large downed logs for rest and den sites (Lofroth et al. 2010, Weir et al. 2012, Aubry et al. 2013), and female fishers require cavities in large live trees or large snags as natal den sites (where kits are born). Fishers were extirpated in Washington in the early to mid-1900s as a result of over-trapping, incidental mortality, and loss of habitat (Lewis and Stinson 1998, Aubry and Lewis 2003). Fisher recovery efforts in Washington include the ongoing reintroduction program in western Washington, which includes portions of the NCE (NPS 2014; Lewis 2013).

In 2000, the Canada lynx was federally listed as threatened but had been protected in the state of Washington as threatened since 1993. Canada lynx inhabit coniferous forests and wet bogs throughout most of Canada, Alaska, and some northern areas in the contiguous United States. This feline species is very dependent on snowshoe hare as their primary food item, and the presence of adequate numbers of snowshoe hare is a key characteristic that defines its habitat. In Washington State, Canada lynx are primarily found in high-elevation forests in the north-central and northeast part of Washington, including subalpine and high elevation mixed conifer zones in the Cascades generally above 3,600 feet. In 2008, the Canada lynx population in Washington was estimated at approximately 87 individuals, with the highest concentration occurring in the Okanogan-Wenatchee National Forest portion of the NCE. However, revised estimates of female home range sizes in 2015 suggest that the carrying capacity for female lynx has declined from 43 in 1996 to 27 in 2014 (Lewis 2016). The naturally fragmented nature of Canada lynx habitat and low availability of suitable habitat outside of the Okanogan region continues to challenge this species conservation and population (Stinson 2001).

Cougars favor dense forests, steep canyons, and rock outcroppings that provide good stalking cover while hunting, while grizzly bears tend to occupy more open habitats. Adult cougars typically prey on deer, elk, moose, mountain goats, and wild sheep, with deer being the preferred and most common prey. Other prey species, especially for younger cougars, include raccoons, coyotes, rabbits, hares, small rodents, and occasionally pets and livestock. A large male cougar living in the Cascade Mountains kills a deer or elk every 9 to 12 days, eating up to 20 pounds at a time and burying the rest for later (WDFW 2005). Grizzly bears in the North Cascades would likely occasionally scavenge cougar kills.

Bobcats are opportunistic predators that prey on a wide variety of animals, including mice, voles, rabbits, gophers, mountain beaver, marmots, fawns, insects, reptiles, birds, and carrion. Rock cliffs, outcroppings, and ledges are important to bobcats; however, bobcats can commonly be found in open fields, meadows, and agricultural areas where brushy or timbered areas are nearby for escape (WDFW 2007a).

Black bears are opportunistic omnivores that feed on grasses, grubs, insects, berries, carrion and human-related foods. They are found in a number of states in the Unites States as well as Canada. In Washington State, black bears sometimes also damage conifers seeking the sap they produce (Ziegltrum and Nolte 2001). The statewide bear population has been estimated to be somewhere between 25,000 and 30,000 animals (WDFW 2007b). Black bears live in a variety of habitats, although they are primarily found in forested areas.

Birds

According to the North Cascades National Park species list provided on the NPSpecies database, more than 200 species of birds in 38 families can be found in NCE habitats that range from alpine meadows to low elevation forests and wetlands. Many of these species are abundant or are increasing, whereas a few have had decreasing populations requiring protection. Two protected species, marbled murrelet (*Brachyramphus marmoratus*) and northern spotted owl (*Strix occidentalis*), are listed as threatened under the ESA. Other species include bald eagle (*Haliaeetus leucocephalus*), northern goshawk (*Accipiter gentilis*), sharp-tailed grouse (*Tympanuchus phasianellus*), common loon (*Gavia immer*), flammulated owl (*Psiloscops flammeolus*), Vaux's swift (*Chaetura vauxi*), Lewis' woodpecker (*Melanerpes lewis*), white-headed woodpecker (*Leuconotopicus albolarvatus*), black-backed woodpecker (*Picoides arcticus*), and pileated woodpecker (*Dryocopus pileatus*). Many migrating, breeding, and wintering species of birds are attracted to the rivers, lakes, and streams in the NCE. One of the largest wintering populations of bald eagles in the continental United States occurs within the Skagit River watershed. Clear, fast-flowing rivers and streams host breeding populations of Harlequin ducks (*Histrionicus histrionicus*) (NPS 2016a).

The NCE is within the Pacific Flyway Corridor, and many migratory species, including raptors, pass through the NCE during their spring and fall migrations (FWS 2016b). More than half of the species breeding in the NCE are migratory species. However, the species potentially affected would be those that may be nesting close to grizzly bear restoration activities, specifically when grizzly bears are released using helicopters.

Fish

According to the North Cascades National Park species list, 28 fish species are considered to be present in the park complex, of which 24 are native. Some of these species, especially salmon and trout, have experienced declining populations, whereas other species are stable or increasing. Some of these species could be potential prey species for grizzly bears, including peamouth (*Mylocheilus caurinus*), northern pikeminnow (*Ptychocheilus oregonensis*), coastal and westslope cutthroat trout (*Oncorhynchus clarkii*), chum salmon (*Oncorhynchus keta*), coho salmon (*Oncorhynchus kisutch*), rainbow trout (*Oncorhynchus mykiss*), sockeye salmon or kokanee (*Oncorhynchus nerka*), mountain whitefish (*Prosopium williamsoni*), bull trout (*Salvelinus confluentus*) and Dolly Varden (*Salvelinus malma*) (NPS 2016a). In addition, Okanogan-Wenatchee National Forest supports runs of Middle Columbia River steelhead (*Oncorhynchus mykiss*) and Upper Columbia River spring-run Chinook (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss)*, and Mt. Baker-Snoqualmie National Forest supports runs of Puget Sound steelhead and Puget Sound Chinook salmon (*Oncorhynchus mykiss*) (USFS 2015a).

Climate Change

The North Cascadia Adaptation Partnership is a collaborative group with members from USFS, NPS, and the University of Washington that was established in 2010 with the objective to educate the public about the impacts of climate change in the NCE, evaluate the vulnerability of the NCE to climate change, and develop adaptation strategies to climate change based on sound science (Littell and Raymond 2014). USFS analyzed historical climate data in conjunction with global climate models to project what changes

in the climate are likely to occur in the Pacific Northwest. In addition, the Climate Impacts Group at the University of Washington developed datasets of downscaled climate and hydrologic projections to support the vulnerability assessments, which estimated an average regional temperature increase of 2.1°C by 2040 and 3.8°C by 2080. The highest relative increases in temperature are projected to occur during summer months (Littell et al. 2011). While a change in precipitation was predicted, magnitude and direction varied between models. Increases in average temperature are almost certain to decrease the regional snowpack in extent and duration (Elsner et al. 2010; Mote 2003), which may carry substantial implications for species like lynx, wolverine, and other species and their forage or prey, especially cold water fish.

Climate change is likely to alter physical and hydrologic conditions in the NCE in a way that will create shifts in vegetation communities in the area (Littell, Oneil, and McKenzie 2010). Using dynamic models that take into account climate change, current vegetation community composition and plant tolerances, Rogers et al. (2011) predicted shifts in vegetation biomes for three different climate scenarios. The results indicate that alpine tundra may nearly disappear from the NCE and the total area of subalpine forest may decrease.

The effects of climate change on grizzly bears in the NCE are unknown. However, research in Alberta, Canada has shown that higher temperatures and earlier snow melt have contributed to improved food resources for grizzly bears (Nielsen et al. 2013). Grizzly bears historically ranged as far south as northern Mexico and are both habitat and food generalists. Grizzly bears will consume almost anything available including vegetation, living or dead mammals or fish, insects, and human garbage (Knight, Blanchard, and Eberhardt 1988; Mattson, Blanchard, and Knight 1991; Mattson et al. 1991; Schwartz, Miller, and Haroldson 2003). Climate change could also change the habitat as a result in changes in disturbance patterns such as wildfires. However depending on their size and severity, fires may only have short term adverse effects on grizzly bears while providing more long term benefits. For example, "recently burned areas are generally avoided by bears for the first few years after a fire while vegetation recovers, however, following a fire, food resources generally become plentiful and these areas often become highly used habitats by bears" (Lyons et al. 2016 citing Hamer and Herrero 1987 and Apps et al. 2004).

WILDERNESS CHARACTER

The *Wilderness Act* of 1964 established a national wilderness preservation system to be composed of federally owned lands designated by Congress as wilderness areas. By law, these wilderness areas "[…] shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness" (16 USC 1131).

Wilderness character, as described in Keeping it Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System, is a "holistic concept based on the interaction of (1) biophysical environments primarily free from modern human manipulation and impact, (2) personal experience in natural environments relatively free from the encumbrances and signs of modern society, and (3) symbolic meanings of humility, restraint, and interdependence that inspire human connection with nature" (Landres et al. 2015). The qualities of wilderness character are described as follows:

Untrammeled. An untrammeled wilderness is one in which ecological systems and their biological and physical components are autonomous, free from human intervention. By contrast, human actions that restrict, manipulate, or attempt to control the natural world within wilderness degrade the untrammeled quality. Trammeling actions include the removal of nonnative species, intervention in the behavior or

lives of native plants and animals, projects to restore the natural conditions of wilderness, and interference in natural processes and energy flows. These actions may be temporary but, while they are in effect, they affect the untrammeled quality of wilderness.

Natural. A natural wilderness shows minimal effects of modern civilization upon the ecological systems and their biological and physical components. A natural wilderness comprises landforms, soils, waterways, habitats, species, and terrestrial food webs that are largely intact in their natural state and not influenced by human activities and external threats.

Undeveloped. An undeveloped wilderness is an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, with the imprint of man's work substantially unnoticeable. The undeveloped wilderness is impacted by the presence of structures and installations, and by the use of motor vehicles or motorized equipment. These developments are also prohibited by section 4 (c) of the *Wilderness Act*, and are only permissible if they are "necessary to meet minimum requirements for the administration of the area" as wilderness.

Opportunities for Solitude or Primitive and Unconfined Recreation. Opportunities for solitude or primitive and unconfined recreation provide visitors a chance to connect with the natural world, to practice traditional skills, and to have transformative personal experiences. Encounters with other visitors and changes in management that alter visitor recreation behavior can affect opportunities for solitude. Developments that support public recreation decrease the primitive quality of wilderness (as well as the undeveloped quality). Restrictions on visitors in wilderness can reduce the unconfined quality of wilderness.

Other Features of Value. Historic and cultural resources serve as reminders that humans have been using the wilderness for centuries. Preservation, removal, or degradation of these resources can affect this value.

Each administering agency is responsible for preserving the wilderness character of designated wilderness areas. This section describes the designated wilderness areas in the park complex, Okanogan-Wenatchee National Forest, and Mt. Baker-Snoqualmie National Forest. Figure 5 displays the wilderness areas managed by these agencies in the NCE.

Wilderness in the North Cascades National Park Service Complex

The park complex contains 680,850 acres of North America's most spectacular mountain scenery and ancient forests. From its inception in 1968, the park complex was primarily conceived as a wilderness park. Congress established the Stephen Mather Wilderness through the Washington Park Wilderness Bill of 1988, designating 634,614 acres of wilderness across the park complex. An additional 5,226 acres were designated "potential wilderness," contingent on Seattle City Light's plans to implement other hydroelectric projects.

As of 2016, 641,219 acres of designated wilderness exist within the park complex, with another 1,527 acres considered potential wilderness. The only exception to these acres is a corridor 100 feet wide, 50 feet either side of the center of the Cascade and Stehekin River roads. Table 4 shows wilderness acreage on NPS managed land within the NCE.

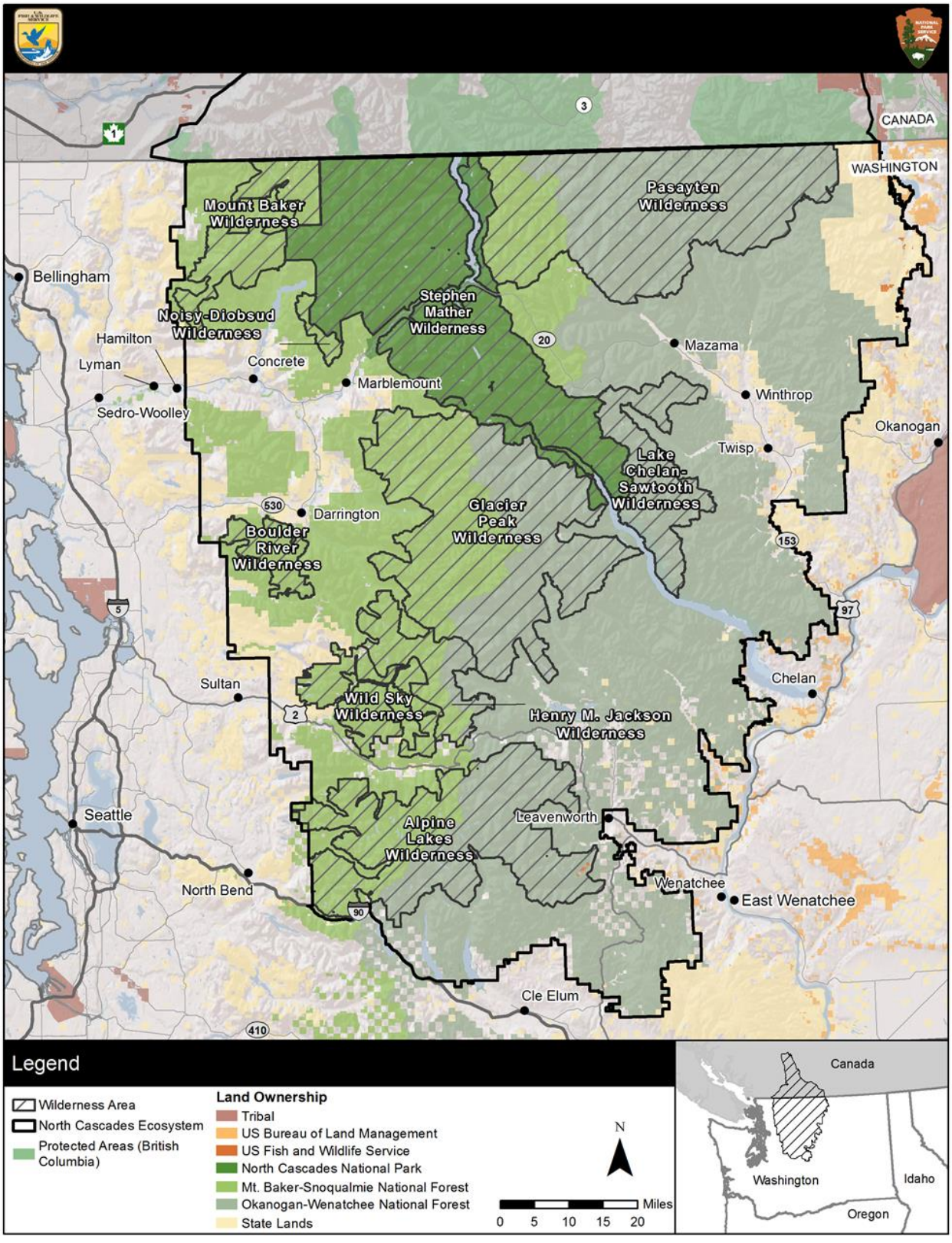

FIGURE 5. WILDERNESS AREAS MANAGED BY THE NATIONAL PARK SERVICE AND U.S. FOREST SERVICE IN THE NORTH CASCADES ECOSYSTEM

TABLE 4. WILDERNESS ACREAGE ON NATIONAL PARK SERVICE LAND IN THE NORTH CASCADES ECOSYSTEM

Wilderness Areas	Acreage	Percent of North Cascades National Park Service Complex in Wilderness
North Cascades National Park	500,779	99%
Lake Chelan National Recreation Area	56,223	89%
Ross Lake National Recreation Area	84,217	73%
TOTAL	**641,219**	**94%**

Source: North Cascades National Park GIS 2016

The current condition of wilderness character within the Stephen Mather Wilderness is described below.

Untrammeled

The Stephen Mather Wilderness is generally unhindered and free from most human manipulation. The park participates in a number of actions that may trammel wilderness, but are implemented in an effort to protect other qualities of wilderness character. Actions mainly include fire suppression and non-native fish management, but also include wildlife management, hazard tree management, and research activities (NPS 2014).

Photo Credit C. Brindle

Bowen Ridge in autumn in the Stephen Mather Wilderness Area

Fire suppression is chosen as a management action when the fire threatens life, improvements, or is determined to be a threat to natural and cultural resources. The act of suppressing the fire, regardless of how many acres have burned, is a direct attempt to control the natural world (NPS 2007a).

Ninety-one mountain lakes (excluding small ponds) within the wilderness have historically been stocked with non-native fish by the Washington Department of Fish and Wildlife (WDFW) as part of its recreational fishery program. Under the 2008 *Mountain Lakes Fishery Management Plan*, removal of reproducing populations of fish and cessation of fish stocking occurs in some lakes. Both stocking and removal of fish is a direct manipulation of otherwise autonomous wildlife, and therefore degrades the untrammeled quality of wilderness character (NPS 2011a). The *North Cascades National Park Service Complex Fish Stocking Act* (2014) authorizes the NPS to stock fish in some of the high mountain lakes, with stipulations.

One unauthorized action that has occurred within the wilderness was the development of a large-scale (5 acres) marijuana plantation. Damage included cutting and limbing of trees to clear the grow sites, terracing of the land, impounding of creeks and installation of irrigation systems, spreading of chemical fertilizers, harassing and trapping wildlife, construction of living quarters and fences, and the spreading of garbage and human waste. This type of action, though small in size, is the most egregious example of an unauthorized action causing trammeling in wilderness (NPS 2011b). The site was dismantled in 2008.

Natural

Photo Credit: A. Braaten

Boston Basin Meadows

Although generally in good condition, natural ecological systems inside the Stephen Mather Wilderness have been, and continue to be, affected by conditions and actions beyond the wilderness boundary. For example, fourteen threatened or endangered amphibians, birds, fishes, flowering plants, insects, and mammals are found in the wilderness, which have been historically impacted by human actions outside of wilderness (FWS 2016c).

Non-native and invasive species can be found throughout the wilderness. Non-native species are those that have been intentionally or accidentally introduced to wilderness by humans or their activities. Invasive species are those that are not only non-native, but also negatively impact the environment. These species threaten the natural processes of the Stephen Mather Wilderness in that they have the potential to outcompete native species and create monocultures in once diverse habitats. Out of approximately 1,675 vascular and non-vascular species in the wilderness, at least 232 of them are non-native and 40 are invasive (NPS 2014; NPS 2011b). While there are no known mammals, reptiles, or amphibians that are non-native or invasive species to the wilderness, the barred owl, a species native to the eastern United States, can be found in the wilderness. As the barred owl has expanded westward, evidence indicates that they are displacing, hybridizing with, and even killing northern spotted owls (Wiens, Anthony, and Forsman 2014). Six non-native fish species are found in the mountain lakes of wilderness (NPS 2014).

Air quality is generally good in the wilderness. Research focusing on atmospheric pollution deposited in snow, from fog, and in surface water shows that the wilderness is receiving mercury and pesticide pollution from sources adjacent to the park complex, as well as from across the Pacific Ocean (NPS 2011b). A wide range of pollutants have been found in vegetation samples. Polychlorinated biphenyls and pesticides have been found in lichens, and mercury and organochlorine compounds have been found in fish tissue.

Water quality is generally good in the Stephen Mather Wilderness. However, Newhalem Creek is listed by Washington State as not meeting state water quality standards for instream flows (NPS 2011b). Little research has been conducted on soils in the Stephen Mather Wilderness. Human-caused soil disturbance or erosion does however occur at a localized scale, usually around trails that are snow-covered well into summer or in campsites where bare ground disturbance has increased over time. Soil crusts in wilderness are generally in good condition (NPS 2011b).

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

Undeveloped

The undeveloped quality of the Stephen Mather Wilderness is generally good; however, the wilderness contains a number of administrative and recreational structures that impact this quality of wilderness character (NPS 2014). These facilities include signs, historic fire lookouts, shelters/cabins, toilets, radio repeaters, snow telemetry monitoring stations, a temporary road (the last mile of Thornton Lakes Road), approximately 100 designated camps with site markers, and a system of over 350 miles of designated trails containing culverts, bridges, puncheon, rock and log-lining, and other historic and non-historic constructed features. There are also a number of permanent research and monitoring plots (NPS 2014).

Motorized equipment and vehicles, such as chainsaws and helicopters, are also used for administrative purposes, which negatively impact the undeveloped qualities of the wilderness. Between 2011 and 2014, the park complex has averaged approximately 142 flight hours over wilderness (Braaten pers. comm. 2016). The flights are often staged outside of wilderness at the Marblemount Ranger Station, Newhalem gravel pit, Diablo Lake Overlook, Ross Lake Overlook, Colonial Creek Boathouse, Hozomeen, Cascade Pass Trailhead, Bridge Creek trailhead, Canyon Creek trailhead, Swamp Creek gravel pit, or the Stehekin Airstrip (NPS 2014) A large percentage of the flights are with smaller, lightweight helicopters such as a McDonald Douglas MD500D or 530F. In addition to NPS administrative use, non-NPS aircraft such as military, commercial, and private sector aircraft fly over the wilderness annually. Two air tour operators exist at the park complex, primarily for the purposes of transportation to and from Stehekin over Lake Chelan; however, few of these flights traverse wilderness (NPS 2014).

Opportunities for Solitude or Primitive and Unconfined Recreation

Opportunities for solitude within the Stephen Mather Wilderness are abundant. Local topography, dense vegetation, and spacing of campsites and trails within the wilderness provide a sense of remoteness from the sights and sounds of other people and human development (NPS 2014). Night sky visibility is excellent at lower elevations but diminishes at higher elevations where light pollution becomes visible from the Seattle-Tacoma and Vancouver metropolitan areas. The natural soundscape is in relatively good condition, though noise intrusions occur from aircraft, motorboats, highway traffic, and NPS administrative activities. Aircraft noise can be heard throughout the wilderness at any time of day, but motorboat and highway noise drops significantly during nighttime hours. The source of NPS-generated noise typically includes chainsaw use to support trail maintenance activities, equipment used to maintain roads near the wilderness boundary, and aircraft used to support fire management, trails, search and rescue, and other administrative activities (NPS 2014). Human-caused sounds also raise the natural ambient levels more during the daytime hours than at night. Even when the contribution of human-caused sounds are removed to produce ambient levels at backcountry locations, the natural ambient levels are high. Acoustic monitoring results provide a clue for why this might be: flowing water and wind are frequently audible. Their presence is the likely cause for high natural ambient levels in the Stephen Mather Wilderness (NPS 2008b).

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

Three areas of classification are used to define and describe opportunity class in the Stephen Mather Wilderness: (1) trailed/established camps, (2) crosscountry I, and (3) and crosscountry II.

They are classified based on the type and amount of use; accessibility and challenge; opportunity for solitude; current resource conditions; and management uses. These areas of classification are described in detail below (NPS 1989):

Areas in the frontcountry are open to fire use in established campgrounds, and stock use is limited to all-purpose trails. Day-hiking visitation is often high, with some overnight visitors passing through en route to their final destinations. Most areas are within one to three hours' hiking time from a trailhead on trails maintained to standard specifications. Frontcountry visitor education efforts of all types are used. In more isolated areas like McGregor Mountain and Easy Pass, the opportunity for solitude is high. Presence of park staff is generally high, with a 90% chance of meeting a ranger in the higher use areas. Visitor education in the form of trail guides or interpretive talks may be available. Impacts from camping and other activities are rehabilitated.

Trailed/established camp areas receive moderate day use and moderate camping use. Camping is restricted to designated sites and party size is limited to 12. Fires are restricted to camps where fire grates are provided; all other camps are personal stoves only. Stock parties are limited to 6 people and stock. Access to major destination areas is from two hours' to several days' hiking on trails maintained to standards. Opportunity for solitude ranges from low where day use and camping overlap, to high at campsites several days distance from the trailhead. Presence of park staff is moderate, with a 25%–50% chance of meeting a ranger or trail crewmember. The number of visitors per camp varies by the size of the camp. They range from 1 to 7 sites in a camp, and a limit of 4 to 12 people. Visitor education is extensive at permit-issuing stations and during on-site contacts. Use limits are based on the number of sites within a camp and the number of tent pads per site. There are 86 established camps, with an average number of two campsites. If all the camps were full, they would accommodate 870 visitors.

Crosscountry I zones include popular climbing routes and bivouac sites. These receive about 75% of all climbing activity in the park complex. Some routes were semi-constructed, while others were established through repeated use and flagged by climbers traveling to climbing areas. This area receives minimal day use and moderate to high camping use, both at designated sites and in crosscountry zones. In Lake Chelan National Recreation Area, stock use is permitted in Dee Dee Lakes, Rainbow Ridge, Rennie, Purple, and Triplet Lakes crosscountry zones. Visitors must camp at least a half mile from maintained trails and one mile from established camps. Subalpine meadows are closed to camping. Fires are prohibited. Party size is limited to 12, and the number of parties is limited in some areas of heavy use. Horse parties are limited to a combination of 6 visitors and stock. Access is at least a two-hour hike on non-maintained routes ranging from easy hiking to technically difficult, requiring knowledge and skills in route-finding and mountaineering.

Opportunity for solitude is moderate to high in crosscountry I zones. Presence of park staff is high in areas of high use. The opportunity for meeting a ranger is from 25% to 90%, depending on the area and day of the week. Designated sites, where present, are maintained to the same standards as trailed/established camps but with minimal developments. These standards are described in the *1989 Stephen Mather Wilderness Management Plan*. Visitor education is extensive both at permit-issuing stations and in the field. Backcountry permits are required for all overnight stays, and climbers are encouraged to sign in and out on a climbing register. No mechanical tools for maintenance are used in wilderness without advance written request for a variance. Aircraft may be used for emergencies and, to a limited extent, for administration of the area. Administrative use is limited to a period before July 4 and after Labor Day, and during the weekdays of Monday through Thursday.

Crosscountry II zones represent about 90% of the wilderness and are the most pristine, with little evidence of human presence. They receive little to no day use. Fires, stock use, and camping in meadows are prohibited. Wilderness permits are required for all overnight stays, and parties are encouraged to sign

in and out on the climbing register. Visitors must camp at least a half mile from maintained trails and one mile from established camps. Party size is limited to 6 party members, and the number of parties may be limited in some areas. Access is more than six hours from a road trailhead, maintained trail, or climbers' route. Routes are minimally visible or non-existent, and require knowledge of route-finding and/or require skills in mountaineering. Opportunity for solitude is high. Presence of park staff is low, with less than a 10% chance of contact. Human impact is not acceptable for camps or routes. Impacted sites are rehabilitated and/or closed. Signing is not permitted in crosscountry II zones.

Other Features of Value

The other features of value in the Stephen Mather Wilderness include historic (e.g., fire towers) and pre-historic cultural resources. These resources are generally in good condition. More than 8,500 years of human presence on the landscape offers a glimpse into the distribution of people across a high mountain environment over centuries of ecological changes in climate and topography. In addition, the wilderness has been, and continues to serve as, an ongoing object of scientific study, offering outstanding opportunities to understand vegetation, wildlife, fire ecology, geology, and water resources.

United States Forest Service

Wilderness areas on USFS land in the NCE span a multitude of environments and elevations ranging from low, open, grassy slopes to timber stands of all ages and varied species; from subalpine and alpine areas to the rugged and rocky mountain peaks. Wilderness areas in each national forest contain a vast number of lakes, and the mountains afford many challenges for rock climbing, mountaineering, and crosscountry travel. They also provide many opportunities for solitude. A wilderness designation carries with it some limits as to the kinds and amount of uses permitted—which differ considerably from restrictions outside of wilderness—and are described in the following subsections. Table 5 shows the wilderness acreage within the NCE on Okanogan-Wenatchee National Forest and Mt. Baker-Snoqualmie National Forest. Pasayten Wilderness and Lake Chelan-Sawtooth Wilderness are managed by Okanogan-Wenatchee National Forest. Mount Baker, Noisy-Diobsud, Boulder River, and Wild Sky are managed by Mt. Baker-Snoqualmie National Forest. Glacier Peak, Alpine Lakes, and Henry M. Jackson are jointly managed by both national forests.

TABLE 5. WILDERNESS ACREAGE ON U.S. FOREST SERVICE LAND IN NORTH CASCADES ECOSYSTEM

Wilderness Area	Acreage	Percent of Okanogan-Wenatchee National Forest / Mt. Baker-Snoqualmie National Forest in Wilderness
Mount Baker	119,522	6.9%
Noisy-Diobsud	14,451	0.8%
Boulder River	49,161	2.9%
Wild Sky	106,909	6.2%
Glacier Peak[a]	566,057	9.9%
Alpine Lakes[a]	391,988	6.8%
Henry M. Jackson[a]	103,297	1.8%
Pasayten[b]	531,539	13.3%
Lake Chelan-Sawtooth[b]	153,057	2.7%
TOTAL	**2,035,981**	**35.6%**

Source: Rohrer pers. comm. 2016.

Wilderness Area	Acreage	Percent of Okanogan-Wenatchee National Forest / Mt. Baker-Snoqualmie National Forest in Wilderness

[a] Jointly managed by Okanogan-Wenatchee National Forest / Mt. Baker-Snoqualmie National Forest. Approximately 51% of the jointly managed wilderness areas are found on Okanogan-Wenatchee and 49% on Mt. Baker-Snoqualmie. Percent wilderness calculated by total acreage of both forests.

[b] Percent wilderness calculated based on 4 million acres (USFS 2011a).

Okanogan-Wenatchee National Forest

The Okanogan and Wenatchee National Forests were administratively combined in 2000, creating Okanogan-Wenatchee National Forest. The forest is managed under the previously existing forest plans for Okanogan National Forest and Wenatchee National Forest. As such, this section contains information from the 1989 *Okanogan Final Land Management Plan* and the 1990 *Wenatchee Final Land Management Plan*, except where noted (USFS 1989).

Okanogan-Wenatchee National Forest encompasses approximately 4 million acres, with more than 1.5 million acres of wilderness within its borders (USFS 2016j). Two areas of classification are used to define and describe opportunity class in Okanogan-Wenatchee National Forest wilderness: (1) pristine/trail-less areas; and (2) primitive/trailed areas.

Pristine/trail-less areas are characterized by an extensive unmodified natural environment where natural processes are not measurably affected by the actions of visitors. Visitors have the most outstanding opportunity for isolation and solitude, free from evidence of human activities and with very infrequent encounters with other visitors. Visitors have outstanding opportunities to travel crosscountry using a maximum degree of primitive skills, often in an environment that offers a high degree of challenge and risk.

Primitive/trailed areas are characterized by an unmodified natural environment with a minimum of on-site controls and restrictions, and where present, controls are subtle. Facilities are only provided for protection of wilderness resource values. Materials for facilities are native, where possible, and are always natural in appearance. Visitors have a low to high opportunity for isolation and solitude, with various levels of evidence of past human activities. Encounters with other users also range from low to high. Access ranges from no trails to well-defined trails.

Approximately 2,855 miles of trail are found in wilderness on Okanogan-Wenatchee National Forest. These trails are not open to motorized or mechanical use, but are generally open to both hiker and stock use. Visitor use on trails and in wilderness ranges from extremely light in the more remote areas, to heavy along major trails and favored attractions. Most visitor use occurs from July through October. Camping, hiking, horseback riding, hunting, and fishing are the primary activities, with the latter two activities accounting for 25% of visitor use in wilderness.

Two vacant sheep allotments exist in the Pasayten Wilderness, while portions of one vacant sheep allotment exist in the Lake Chelan-Sawtooth Wilderness. However, no grazing permits have been recently issued in either of these wilderness areas. Mineral-related activities are occurring in the Pasayten Wilderness and Lake Chelan-Sawtooth Wilderness. Administrative sites are located at Spanish Camp, Stub Creek, and Pasayten Airport, all of which are found in the Pasayten Wilderness. The U.S. Geological Survey maintains a snow survey cabin near Freezeout Creek and a stream gauging station in Andrews Creek within the Pasayten Wilderness. There are remnants of old trapping

cabins scattered across the Pasayten Wilderness; these structures are in various stages of deterioration and may have historical significance.

Most wilderness areas are in a stable or improving trend relative to wilderness character (USFS 2011a). However, there are a number of challenges to management. Natural processes have been disrupted by activities such as fire suppression, fish stocking, non-native plant diseases, and the spread of weeds. A number of areas are easily accessed and receive heavy use. Many of these areas are known for crowding and, in some locations, physical impacts such as the proliferation of campsites are becoming worse. Use of the internet and global positioning systems (GPSs) is resulting in social trail development in formerly pristine locations. In some locations, inappropriate or prohibited uses are occurring such as snowmobile trespass across wilderness boundaries (USFS 2011a).

Mt. Baker-Snoqualmie National Forest

Mt. Baker and Snoqualmie National Forests were administratively combined in 1974, creating the Mt. Baker-Snoqualmie National Forest. Mt. Baker-Snoqualmie National Forest encompasses 1,761,644 acres, with over 840,000 of these acres consisting of wilderness. Five areas of classification are used to define and describe opportunity class in Mt. Baker-Snoqualmie National Forest wilderness: (1) transition; (2) trailed; (3) general trail-less; (4) dedicated trail-less; and (5) special (USFS 1990).

The transition class includes system trails that have a travel-way worn to mineral soil over long distances, and is characterized by having a large proportion of day-users, often mixed in with overnight and long distance travelers. This area is usually adjacent to trailheads and extends into the wilderness a distance that is typically traveled in one day by a hiker. This class includes areas accessed by trail, around lakes, or other attractions used by people or pack stock, within the day-use influence area. The class extends at least 500 feet on either side of a trail, and it may be wider around lakes or heavily used areas. The length of this trail class is established for each trail depending on ease of travel, distance from trailhead outside wilderness, and destination attractions inside wilderness. Length is generally 3 to 5 miles inside the wilderness boundary. If the day-use activity occurs entirely outside wilderness, the trail has no transition. The trailed class includes all managed system trails. It extends beyond the transition class. This class extends at least 500 feet on either side of the trail, but may be wider around lakes or heavily used areas.

The general trail-less class includes areas not falling into the other classes. It attracts very low use because of a relative lack of trails or destination spots. The area is unmodified, and user-made trails are not encouraged but may exist. If obvious user-made trails become well established or are causing resource damage, consideration is given to their reconstruction to protect the wilderness resource from further damage. Reclassification from general trail-less to trailed requires a supplement to the Forest Plan, which includes full public involvement. This class is available for new trail construction or relocation of existing trails to protect resources or meet other objectives by dispersing use. If this should occur, the trail is constructed to no higher than "more difficult" or "most difficult" standards.

The dedicated trail-less class is managed exclusively as a trail-less area, and user-made trails are not permitted. It may include popular attractions accessed only by crosscountry travel. Human impact and influence is minimal; therefore, user restrictions may be necessary to ensure that trail-less experiences remain. Dedicated trail-less areas are of a size that allow for a meaningful experience and can be reasonably protected for the experiences and remoteness identified. Generally, the class is at least 1,000 acres in size, and contains whole drainages out of sight and sound of trails, or areas outside the wilderness.

The special area class intends to provide for significant changes in standards or other management guidelines for unique areas. Areas that qualify for special area designation include congressionally

acknowledged areas, areas of significant cultural or historic value, areas with special considerations, and areas with limited management options to deal with unique situations. Areas do not qualify for this class for administrative convenience in dealing with overuse. The class is rare and does not exist in many wilderness areas.

Mt. Baker-Snoqualmie National Forest has 635 miles of trails in wilderness, the majority of which are found in the Glacier Peak Wilderness. A quarter of this mileage consists of trails in the transition class (USFS pers. comm. 2016g). Hiking accounts for 41% of wilderness use. A majority of this hiking is day-use, a reflection of the accessibility of the wilderness. Another 34% of wilderness use comes from climbing, fishing, hunting, nature study, horse use, and miscellaneous activities. Camping accounts for the remaining 25% of wilderness use (USFS 1990).

Many current and potential conflicts of use exist in Mt. Baker-Snoqualmie National Forest wilderness areas. One of the most severe is overuse at specific locations. Campsite inventories completed in 2013 identified a total of 1,847 sites within wilderness, some of which may be overused (USFS pers. comm. 2016g). Roads and major highways near the wilderness boundary provide easy access, leading to overuse at some sites. Other conflicts include off-road vehicle and snowmobile use overlapping from the Mount Baker National Recreation Area into the Mount Baker Wilderness, military aircraft noise in Alpine Lake Wilderness, Glacier Peak Wilderness, and Mount Baker Wilderness, and historical use of Mount Baker by large climbing parties.

VISITOR USE AND RECREATIONAL EXPERIENCE

The restoration of grizzly bears to the NCE has the potential to affect visitation levels and recreational uses in the park and national forests. Restoration actions could also affect commercially guided backcountry recreation such as mountain climbing, horse packing, and other guided uses. The term backcountry refers to primitive, undeveloped portions of parks and/or forests, some of which may be designated “wilderness” (NPS 2015d). Backcountry activities offer greater opportunities for solitude along with greater challenges (including interactions with wildlife). The term front county may refer to areas near well-developed trails, sites with picnic tables, areas proximate to ranger stations and/or visitor centers, and designated campgrounds (i.e., those with fireplaces, water pumps, and/or bathrooms). Visitors can partake in both front country and backcountry activities throughout the NCE.

Visitor Use in the North Cascades National Park Service Complex

The park complex attracts approximately 826,000 visitors per year, the majority of whom visit Ross Lake National Recreation Area (772,579 in 2015). Lake Chelan and North Cascades National Park attracted 32,186 and 20,677 visitors respectively in 2015 (NPS 2016c). In June, July, and August 2015, recreation visits to Lake Chelan and North Cascades National Park totaled 15,100 (3,277 in June; 6,297 in July; and 5,526 in August) (NPS 2015e).

In the past decade, no visitor surveys have been conducted for the North Cascades National Park or the Lake Chelan National Recreation Area. A visitor survey was conducted for Ross Lake National Recreation Area in 2007 (NPS 2007b). According to that survey, the average party size for all visitors to Ross Lake National Recreation area was 3.2 people, and 51.1% of parties included two people. Almost two-thirds (63%) of all visitors who stayed overnight spent one or two nights, and 92% of overnight visitors spent between one and four nights. Of visitors who did not stay overnight, visitors for whom Ross Lake was the primary destination stayed an average of four hours, while incidental visitors stayed approximately two hours. The average for all visitors was three hours. The North Cascades Visitor Center near the town of Newhalem along State Route 20 is one of two main visitor centers within the park

complex. Golden West Visitor Center, which is the visitor contact point for the Lake Chelan National Recreation Area, is the other main visitor center.

According to NPS, backcountry visitation in the park complex in the summer of 2015 was higher than average due to low snowpack. Visitors must obtain backcountry use permits for overnight camping and adhere to additional rules and regulations when visiting backcountry areas. Popular activities include hiking, mountaineering, rock climbing, whitewater rafting, and wilderness camping. Among visitors to the backcountry, 77% were Washington State residents; 19% were residents of other states; 3% were residents of British Columbia, Canada, and 1% were residents from other areas (2015). The average group size for backcountry visitors was three people (NPS 2015e).

Visitor Use of National Forest Lands in the North Cascades Ecosystem

The national forests within the NCE attract many visitors per year. In 2010, Mt. Baker-Snoqualmie National Forest and Okanogan-Wenatchee National Forest attracted 3,363,000 national forest visits. Of these areas, Mt. Baker-Snoqualmie National Forest attracted 1,995,000 national forest visits, and Okanogan-Wenatchee National Forest attracted 1,368,000 national forest visits (USFS 2016a).

According to a FY 2010 USFS Visitor Use Report for the Okanogan National Forest, almost one-quarter of visits come from people living within 25 miles of the forest. However, more than one-third of visits are from people who live more than 200 miles away (USFS 2011b). The USFS also produced a Visitor Use Report for the Wenatchee National Forest, analyzing data from FY 2010. According to that report, approximately 45% of visits come from people who reside within 50 miles of the forest, while 40% of visitors live between 75 and 200 miles away (USFS 2011c).

Most visits to Okanogan National Forest last less than 5 hours. However, the average is more than 20 hours, indicating that some visitors stay significantly longer. A majority (63%) of visits come from people who frequent the forest no more than five times annually (USFS 2011b).

According to 2010 data provided by Mt. Baker-Snoqualmie National Forest, the average group size for forest-wide visitors was 3.47 adults and 2.63 children under the age of 17. The average number of adults in groups visiting backcountry areas was 2.75, while the average group size for adults visiting front country areas was 2.85 (Plumage pers. comm. 2016a)

Recreation on Federal Lands within the North Cascades Ecosystem

Recreational use of federal lands in the NCE is estimated to be 8 million recreation visitor days per year. Most of this use is associated with dispersed recreation rather than developed campgrounds or wilderness areas (figure 6). Almost l million recreation visitor days occur annually in wilderness areas; however, visitation is not equally distributed, and some areas receive much higher recreational use than others. The majority of the trails in the NCE occur in wilderness and roadless areas. Recreation also occurs on lands managed by the State of Washington, although state lands make up a relatively small portion of the NCE. As noted by Almack et al. in 1993, recreational use data for these areas are not readily available.

Both the NPS and USFS encourage and sustain a diverse and balanced spectrum of quality recreation opportunities within the NCE. Recreational activities enjoyed by visitors to both national park and national forest lands include hiking, backpacking, biking, birding, boating, fishing, hunting (on forest lands and within the NPS national recreation areas only), swimming, horseback riding, and mountain and rock climbing. Several of these activities are described in further detail below.

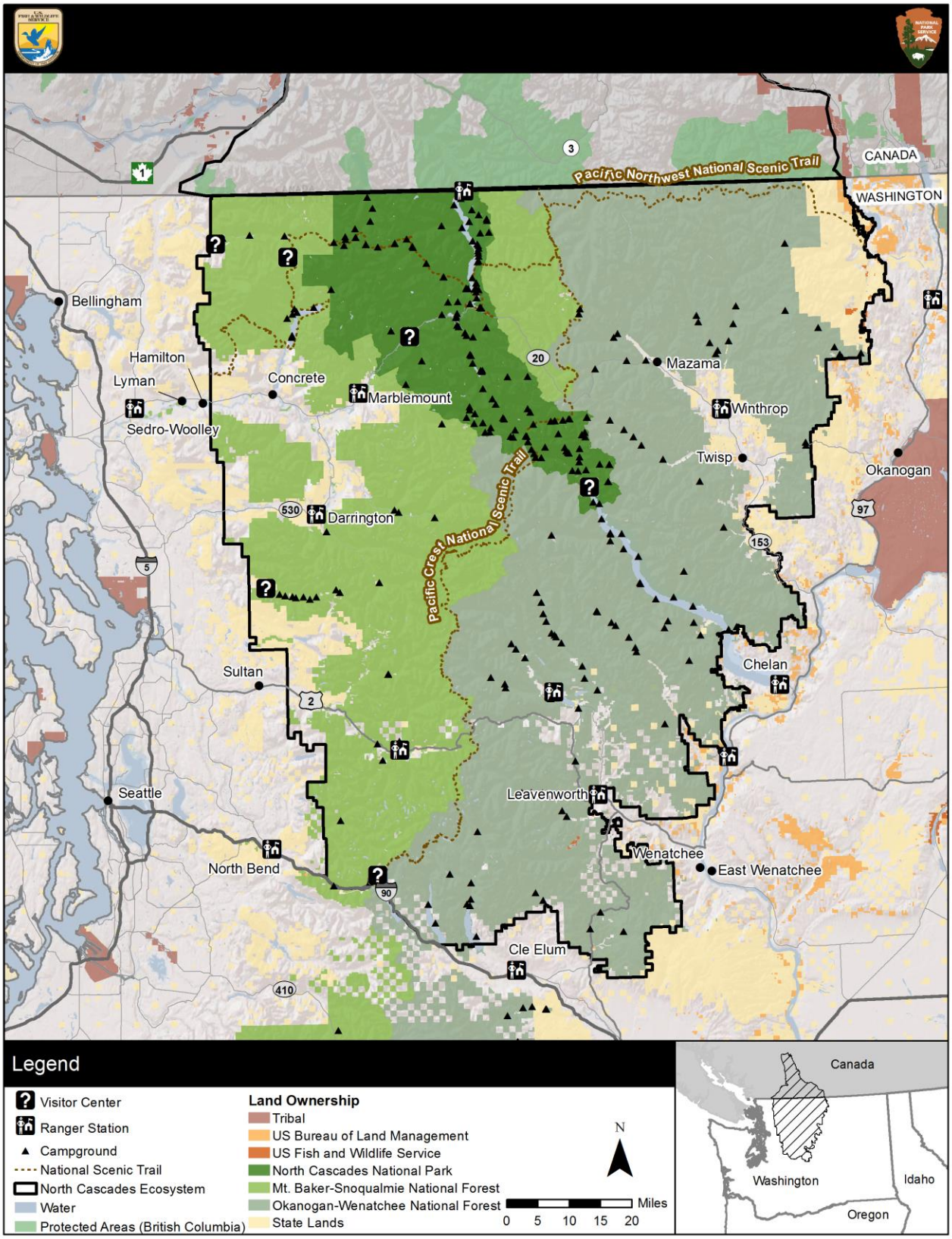

FIGURE 6. RECREATIONAL OPPORTUNITIES IN THE NORTH CASCADES ECOSYSTEM

Guided Recreation

North Cascades National Park issued 75 permits for guided activities during 2013–2014. The majority of these permits (54 permits or 72%) were issued to companies and individual enterprises that provide guided backpacking (including mountaineering and paddling). Nine permits were issued for guided rafting and fishing. Stock packing and day hiking accounted for one and two permits, respectively (Oelfke pers. comm. 2016).

Mt. Baker-Snoqualmie National Forest currently administers over 270 outfitting and guide permits, authorizing over 8,600 service days. However, current permitted outfitting and guiding represents less than 1% of total annual non-ski recreation visits to the forest (Plumage pers. comm. 2016a).

On a yearly basis, Okanogan-Wenatchee National Forest administers approximately 55 priority-use outfitting and guiding permits and 15 temporary permits. Approximately 25,000 service days are used annually, including both priority and temporary use service days. The most popular activities are those involving stock use (i.e., trail rides, pack trips, and wagon rides) (Rohrer pers. comm. 2016).

Camping

The park complex offers a full range of camping experiences, including traditional automobile access camping, boat-in camping, and wilderness/backcountry camping. There are six automobile access campgrounds in the park complex and 25 total boat-in campgrounds between Diablo Lake, Ross Lake, and Lake Chelan (NPS 2015f).

These boat-in camping areas have anywhere from 1 to 22 individual campsites, while the automobile access camping areas range from 1 to 142 individual campsites. Boat docks are present at 3 boat-in camping areas at Diablo Lake, 19 boat-in camping areas at Ross Lake, and 3 boat-in camping areas at Lake Chelan.

Within North Cascades National Park alone, there are 140 backcountry campsites available; all require permits. In June, July, and August 2015, there were 18,648 total backcountry overnight stays within the North Cascades National Park alone (3,451 in June; 7,711 in July; and 7,486 in August) (NPS 2015f). During the same time period, there were 15,216 total backcountry overnight stays in the Ross Lake National Recreation Area (2,587 in June; 6,940 in July; and 5,689 in August) and 3,678 total backcountry overnight stays in the Lake Chelan National Recreation Area (1,223 in June; 1,397 in July; and 1,058 in August) (NPS 2015f).

More than 150 campgrounds and picnic areas are located in Okanogan-Wenatchee National Forest, including group camping areas, dispersed/undeveloped camping areas, and RV camping areas (USFS 2015b). Mt. Baker-Snoqualmie National Forest features 27 designated campgrounds (USFS 2015b).

Hiking

The Washington Trails Association lists 626 hikes in the North Cascades region, which they define as an area inclusive of Mount Baker, the North Cascades Highway (Route 20), the Mountain Loop Highway, Methow/Sawtooth, and Pasayten (Washington Trails Association 2016). The NPS estimates that approximately 400 miles of trails are located in the park complex. Sixty-seven designated trails range significantly in both length and level of difficulty. For example, the Skagit River Loop is a 1.8-mile round trip trail that follows the river and is suitable for all skill levels. By contrast, the Sourdough Mountain Trail is a 10.4-mile roundtrip trail, described as one of the most strenuous hikes in the park and

appropriate for experienced hikers only. It features steep climbs and passes through forest and then meadow communities before arriving at the fire lookout.

There are more than 1,500 miles of designated hiking trails in Mt. Baker-Snoqualmie National Forest and more than 800 miles of trails in Okanogan National Forest (National Forest Foundation 2016). Two National Scenic Trails pass through the recovery area: the Pacific Crest Trail and the Pacific Northwest Trail. The Pacific Crest Trail begins at the Canadian-U.S. border and runs southward through North Cascades National Park, Mt. Baker-Snoqualmie National Forest, and Okanogan-Wenatchee National Forest (USFS 1982). It is one of the original National Scenic Trails established by Congress in the 1968 *National Trails System Act*. The Pacific Northwest Trail passes through the Pasayten Wilderness and other parts of Okanogan-Wenatchee National Forest on the east side of the NCE, and through the Mt. Baker Wilderness and other parts of Mt. Baker-Snoqualmie National Forest on the west side of the NCE. The 63-mile segment that passes through North Cascades National Park and Ross Lake National Recreation Area is a designated National Recreation Trail (NPS 2016d). First proposed in the early 1970s, the Pacific Northwest Trail was designated by Congress as one of eleven National Scenic Trails in the *Omnibus Public Lands Management Act* of 2009.

Climbing

The numerous peaks and glaciers within the NCE present a variety of climbing opportunities, including classic mixed mountaineering routes, intricate glacier travel, sport climbing, bouldering, and scrambling. At 10,781-feet, Mount Baker is the third highest summit in the State of Washington and the most heavily glaciated mountain in the Cascade Range (USGS 2016a). Summit attempts are made year-round, although the warmer months (May–August) are much more popular, given better weather conditions. Of the 8,600 service days, approximately 6,500 of these days are authorized for guides leading trips on Mount Baker for climbing, avalanche training, and other snow related activities. Service days are defined as a day or any part of a day on National Forest System lands for which an outfitter or guide provides goods or services, including transportation, to a client (USDA 2014). There are another documented 4,500 days of use by guides, schools, and civic groups on Mount Baker who are awaiting permits. Within Okanogan-Wenatchee National Forest, popular climbing peaks include: Bonanza Peak, Silver Star Mountain, Black Peak, Mount Fernow, Mount Maude, Seven-Fingered Jack, Gardner Mountain, and North Gardner Mountain (Terry 2015).

Fishing and Water-Based Recreation

The fresh, cold, and often glacially fed lakes, rivers, and streams of the NCE provide ideal habitats to support healthy fish populations, including northwest salmon and steelhead, several species of trout, and a variety of warm-water fish (NPS 2009). Within the park complex, there are dozens of fishing areas; the most notable are Ross Lake, Diablo and Gorge Lakes, and the Stehekin River. The park complex also includes 62 mountain lakes containing introduced fish. These include Lower Thornton, Monogram, McAlester, and Rainbow Lakes.

The WDFW notes high lake trout fishing as a popular activity and lists dozens of high altitude lakes within the national forests, including Kachess Lake, Galena Chain Lakes, Slide Lake, Lake Jauns, and numerous others (WDFW 2016c). Lower altitude fishing spots include Keechelus Lake and Cle Elum Lake as well as many rivers (WDFW 2016c). Boating, swimming, whitewater rafting, water-skiing, jet-skiing, parasailing, kayaking, canoeing, rowing, and tubing are also popular activities on some of the lakes and rivers within the NCE. Motorized boating is permitted in Okanogan-Wenatchee National Forest in four ranger districts (USFS 2016b). Whitewater rafting is permitted in rivers that traverse both Mt. Baker-Snoqualmie National Forest and Okanogan-Wenatchee National Forest. Popular permitted rivers include the Methow, Wenatchee, Sauk, Skagit, Skykomish, Suiattle, and North Fork Nooksack. The

rafting season typically runs from late March to early August. The U.S. Department of Agriculture website lists 16 guides/outfitters for whitewater rafting in Mt. Baker-Snoqualmie National Forest (USFS 2016c).

Winter Sports

Cross country skiing, snowmobiling, and other winter sports opportunities are available in partnership with Methow Trails, Okanogan Valley Nordic Ski Association, Highlands Ski Club, and the Okanogan County Snowmobile Advisory Board. The USFS manages ski/snowboard areas at Crystal Mountain (Lake Chelan 2016), Mount Baker (USFS 2016f), Stevens Pass, the Summit at Snoqualmie, Mission Ridge, Echo Ridge, and Loup Loup Ski Bowl. Skiers accounted for 634,000 national forest visits in the NCE in 2010. Mt. Baker-Snoqualmie National Forest had the most ski-related national forest visits (443,000), followed by Okanogan-Wenatchee National Forest, which had 191,000 skiing-related visits. Dog sledding, snowmobiling, and heli-skiing are also permitted in Okanogan-Wenatchee National Forest (Rohrer pers. comm. 2016).

Other Activities

Within the NCE, the most favored horseback riding trails are located in the southeast section of the park complex, along Bridge Creek (Pacific Crest Trail) and throughout the Lake Chelan National Recreation Area. West side stock trails include the East Bank Trail, the west side of Ross Lake and Big Beaver Trail, and the Thunder Creek Trail (NPS 2016e). Both Mt. Baker-Snoqualmie National Forest and Okanogan-Wenatchee National Forest offer more than 100 horseback riding trails and designated areas (USFS 2016d). The WDFW issues hunting permits for both National Forests, Lake Chelan and Ross Lake Recreation Areas, and several game management units within the NCE (USFS 2016e). Permit holders are allowed to hunt several animals that could be affected by grizzly bears: deer, elk, bighorn sheep, coyote, raccoon, rabbit and hare, and wild turkey (WDFW 2016d).

PUBLIC AND EMPLOYEE SAFETY

Various safety concerns could result from implementation of the alternatives described in this draft plan/EIS. These concerns would apply to park and national forest visitors; local residents; and NPS, FWS, WDFW, and USFS employees and volunteers. Grizzly bear restoration activities would need to be conducted in a manner that would ensure the safety of visitors, employees, local residents, and volunteers.

Public and Employee Safety in the North Cascades National Park Service Complex

North Cascades National Park provides bear safety information on its website and also posts signage and provides interpretive materials at park visitor centers (NPS 2015g). This information was initially generated with a focus on black bear management, but similar safety information and guidance would apply to grizzly bears. To date, no incidents of visitor or employee injury as a result of interaction with bears have been reported in the park (Braaten pers. comm. 2016).

The park provides a list of safety precautions to reduce the risk of negative interactions with bears. These include instructions on safe hiking protocol; proper camp sanitation, cooking, and food storage procedures; proper procedures for camping with pack animals; proper procedures for boat camping; and proper responses to bear encounters. The safety precautions promoted by the park also help to achieve a fundamental goal of the NPS: to keep the wildlife in the protected areas of the NCE wild and neither attracted to nor dependent on people (NPS 2015g).

The NPS requires proper storage of food and other attractants (Title 36 CFR chapter 1, section 2.10(d) and section 2.2(a)(2)) anywhere within park boundaries. Visitors obtaining permits for backcountry camping receive information about storage, safety, and wildlife concerns as a part of the permitting process. Bear-resistant food storage canisters are available for loan at the Wilderness Information Center in Marblemount; visitor contact stations in Sedro-Woolley and Glacier; and the Golden West Visitor Center (Braaten pers. comm. 2016). Many of the developed campgrounds are equipped with bear-resistant trash receptacles, and NPS is currently in the process of replacing all standard trash receptacles at campgrounds with bear-resistant units (Braaten pers. comm. 2016). Some developed campgrounds, including all boat-in campgrounds, are also equipped with food storage lockers (NPS 2015g). In addition, some of the backcountry campgrounds are equipped with poles or wires, provided for hanging food out of the reach of bears (NPS 2015g). Many backcountry campgrounds are not equipped with bear-resistant infrastructure; however, when campsites are moved or upgraded they are designed to have separate cooking and food storage areas roughly 100 feet from tent pads (Braaten pers. comm. 2016).

The park encourages reporting of bear interactions, and implements a number of procedures to respond to conflict bears (bears that have become habituated to humans or conditioned to human foods). Typically the response to a negative interaction between a visitor and a conflict bear could involve the following (Braaten pers. comm. 2016):

- Finding and removing or securing a bear attractant (always done).
- Increased public outreach efforts in areas where human-bear conflict has been reported, by means of signage and increased visitor interaction with interpretive, wilderness, and law enforcement staff (always done).
- Campground closures; temporary (2–4 week) closures have been used previously in some backcountry areas (rarely necessary).
- Use of aversive conditioning and/or on-site release if the bear returns (infrequently done; it is not typical for a bear to return once an attractant has been removed). The NPS has obtained assistance from the WDFW's Karelian Bear Dog program to provide aversive conditioning to black bears frequenting front-country areas (Braaten pers. comm. 2016).
- Relocation of conflict bears. Relocation is very rarely used and occurs only when no other options are available. Relocations are less effective and lead to higher mortality rates than remediating the source of the problem and employing on-site releases (Clark et al. 2002, 2003; Landriault et al. 2009).

National Forest Lands

WDFW has primary responsibility for bear management and conflict bear response on National Forest land. WDFW implements a number of ongoing efforts to educate the public about bear safety, including providing bear safety information and materials on the agency website and community engagement by district biologists and assistant biologists. WDFW also maintains online system for collecting dangerous wildlife incident reports and makes enhanced efforts to promote bear safety when notified about specific incidents, such as bears near schools or neighborhoods (Gardner pers. comm. 2016).

The WDFW works with property owners and renters, homeowner and neighborhood associations, schools, and others living and working in bear country, to educate them about bears and bear biology, and to remove attractants to prevent bears from foraging for food on these properties. As communities continue to expand into bear habitat and the wild-urban interface increases, it is expected that some bears and other wildlife will use developed sites. Bears which are not foraging for human foods or exhibiting dangerous behaviors, but are in proximity to houses, schools, parks, and/or other public areas can be

successfully and preemptively encouraged to avoid human activity by use of on-site releases, less-lethal ammunition and specially-trained Karelian Bear Dogs. Conflict bears may receive aversive conditioning via the same methods. On-site releases of conflict bears are highly effective when attractants have been secured, and this method is used when and where possible. The removal of attractants is critical to the success rate for both non-conflict and conflict bears. A list and map of nearby gateway communities is provided in the "Socioeconomics" section following this section.

Relocation is used when a bear is captured in areas where there is no clear route from the point of capture for the bear to move to appropriate bear habitat or wilderness areas. Under WDFW policy, there are designated release areas for relocation of bears, which are determined by the WDFW Wildlife Program. Karelian bear dogs are used at the point of release when bears are captured and relocated to condition the bear and for WDFW employee safety (Gardner pers. comm. 2016).

In addition to the efforts undertaken by WDFW, the USFS provides safety information on various subjects, including bear safety, at the forest headquarters and district ranger stations. Signs placed at developed campgrounds and most trailheads provide information on bears, how to keep a clean camp, and how to behave in the event of a bear encounter. All employees, contractors, permittees, outfitters and guides are required to store food, garbage and other attractants using proper bear-resistant techniques. Employees are responsible for providing information to the public on proper storage techniques for food and garbage. Information on public safety tips and warnings is provided on the forest websites and at times is covered during weekly radio interviews. If a bear is frequenting a campground, trailhead, or other National Forest facility where it is frequently being encountered by humans at close range, USFS notifies and works cooperatively with WDFW to resolve the conflict. In some instances, temporary closures of campgrounds have been enforced until a conflict bear is captured by the WDFW or moves on (Rohrer pers. comm. 2016).

SOCIOECONOMICS

It is possible that grizzly bear restoration in the NCE could result in socioeconomic impacts within the NCE and the surrounding region. The regional economic context for these potential impacts is described below. The region of influence (ROI) for this socioeconomic analysis includes the seven counties that fall within the boundaries of the NCE, since any impacts associated with grizzly bear restoration within the NCE are most likely to be perceptible in these counties. In addition, these seven counties represent the area within which the primary and secondary economic impacts of the project are likely to occur. Furthermore, NPS defines gateway regions that are impacted by parks as communities located within 20 miles of a park, which this seven-county ROI encompasses. The seven-county ROI includes Chelan, King, Kittitas, Okanogan, Skagit, Snohomish, and Whatcom counties. While these counties contain several larger cities, including Bellingham, Everett, Seattle, and Wenatchee, the NCE is located in a predominantly rural area away from large urban areas. The area that covers the NCE comprises approximately 52% of the total land area of the ROI. In addition, information on the state of Washington is presented below to provide overall context associated with areas within and adjacent to the NCE where bears may move.

Human Activity in the Region of Influence and Influence on Bears

Almack et al. (1993) and Gaines et al. (1994) mapped out areas of human activity in the NCE including roads, timber operations, livestock grazing, population centers, campgrounds, and other recreation areas (e.g., ski areas, air strips, etc.). Both studies found that the majority of the NCE (68%) was free of open roads; only small portions of Okanogan-Wenatchee National Forest were grazed (11% for Okanogan and 3% for Wenatchee); and a small percentage (4%) of the area in the NCE was within a large zone of

influence around population centers and other areas. Almack et al. (1993) concludes that the level of human activities within the NCE at the time of the study did not preclude the recovery of a viable population of grizzly bears. A 2016 grizzly bear carrying capacity modeling report by Lyons et al. (2016) similarly concludes that the current level of human activities within the NCE, notably the influence of roads, would still allow for the restoration of a viable population of grizzly bears.

Population

Table 6 provides the total population count for the State of Washington and for each of the counties within the ROI. Between 2000 and 2013, the population of the ROI grew by 15.4% from approximately 2.75 million to 3.2 million people, comprising a little less than half the state's total population (U.S. Census Bureau 2013). King County was the most populated county in the ROI between 2000 and 2013, representing 60.8% of the total population of the ROI on average, annually, between 2009 and 2013.

TABLE 6. TOTAL POPULATION

Geographic Area	2000	2013*	% Change 2000–2013
Washington	5,894,121	6,819,579	15.7%
ROI	2,752,393	3,175,527	15.4%
Chelan	66,616	73,047	9.7%
King	1,737,034	1,974,567	13.7%
Kittitas	33,362	41,291	23.8%
Okanogan	39,564	41,143	4.0%
Skagit	102,979	117,641	14.2%
Snohomish	606,024	724,627	19.6%
Whatcom	166,814	203,211	21.8%

Source: U.S. Census 2013

* These numbers represent average, annual statistics from 2009 through 2013.

The majority of the population base of the ROI lives closer to Puget Sound and urban areas such as Bellingham, Mount Vernon, Everett, and Seattle. The NCE and the immediately surrounding areas are sparsely populated, as indicated by figure 7, which shows the population density of the NCE and the surrounding area.

Gateway Communities

Gateway communities are those cities and towns that are geographically close to the NCE and derive some measurable economic benefit from tourism and related activities within the NCE. For the purposes of this document, these communities are generally located within approximately 20 miles of the NCE (figure 8).

Gateway communities differ from other communities within the State of Washington largely because of their relationship with the park complex, Mt. Baker-Snoqualmie National Forest, and Okanogan-Wenatchee National Forest. Some of these communities have a history of tourism, while others are a stop for travelers en route to destinations within the NCE. Historically, a number of these communities relied on agriculture, timber, and mining, but have shifted their focus to tourism and related activities against the backdrop of the current economic landscape. That is, these historic industries are less lucrative and/or less available given changes in resource demand, technology, and growing dependency on non-local resources (WA State Employment Security Department 2016).

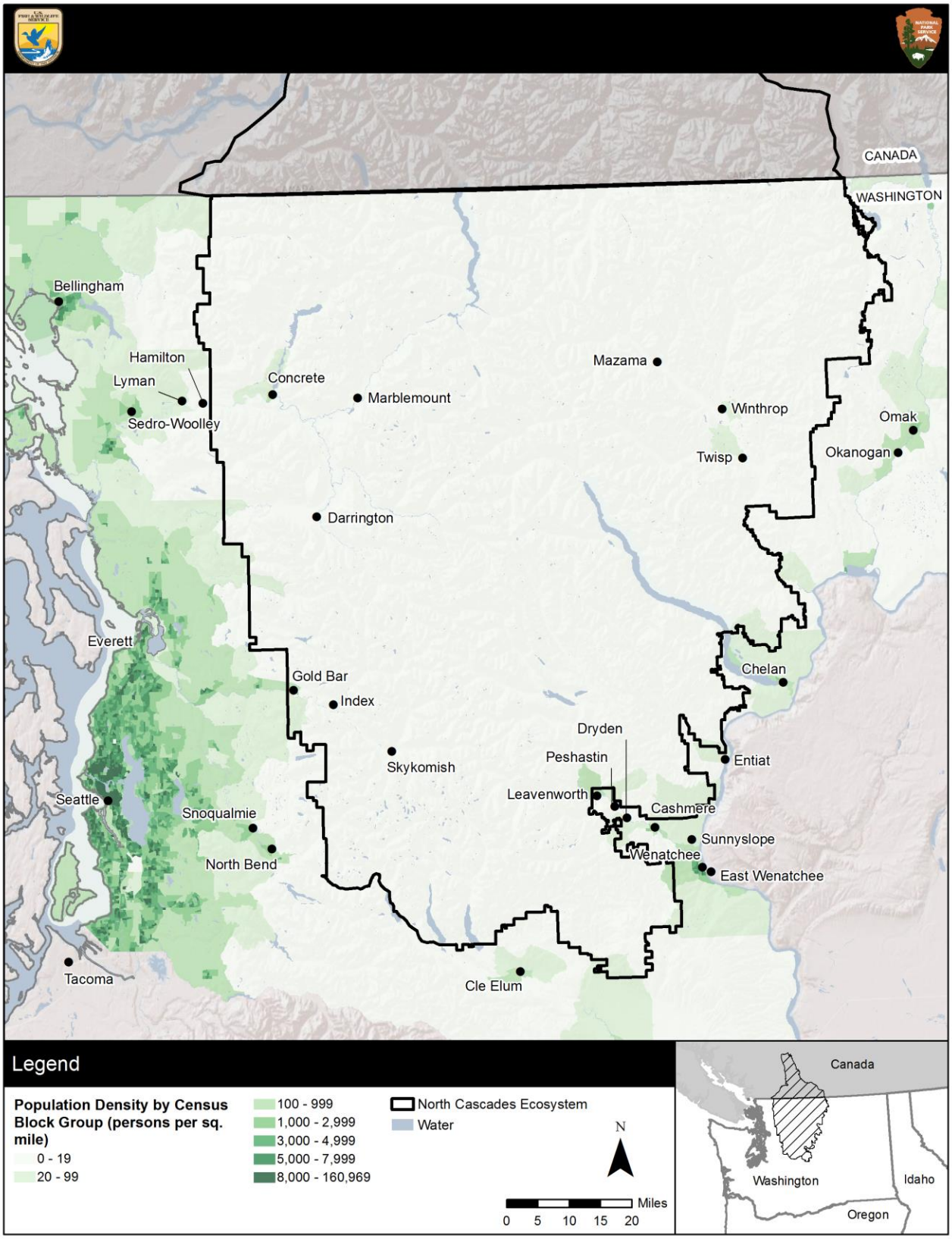

FIGURE 7. POPULATION DENSITY IN THE NORTH CASCADES ECOSYSTEM

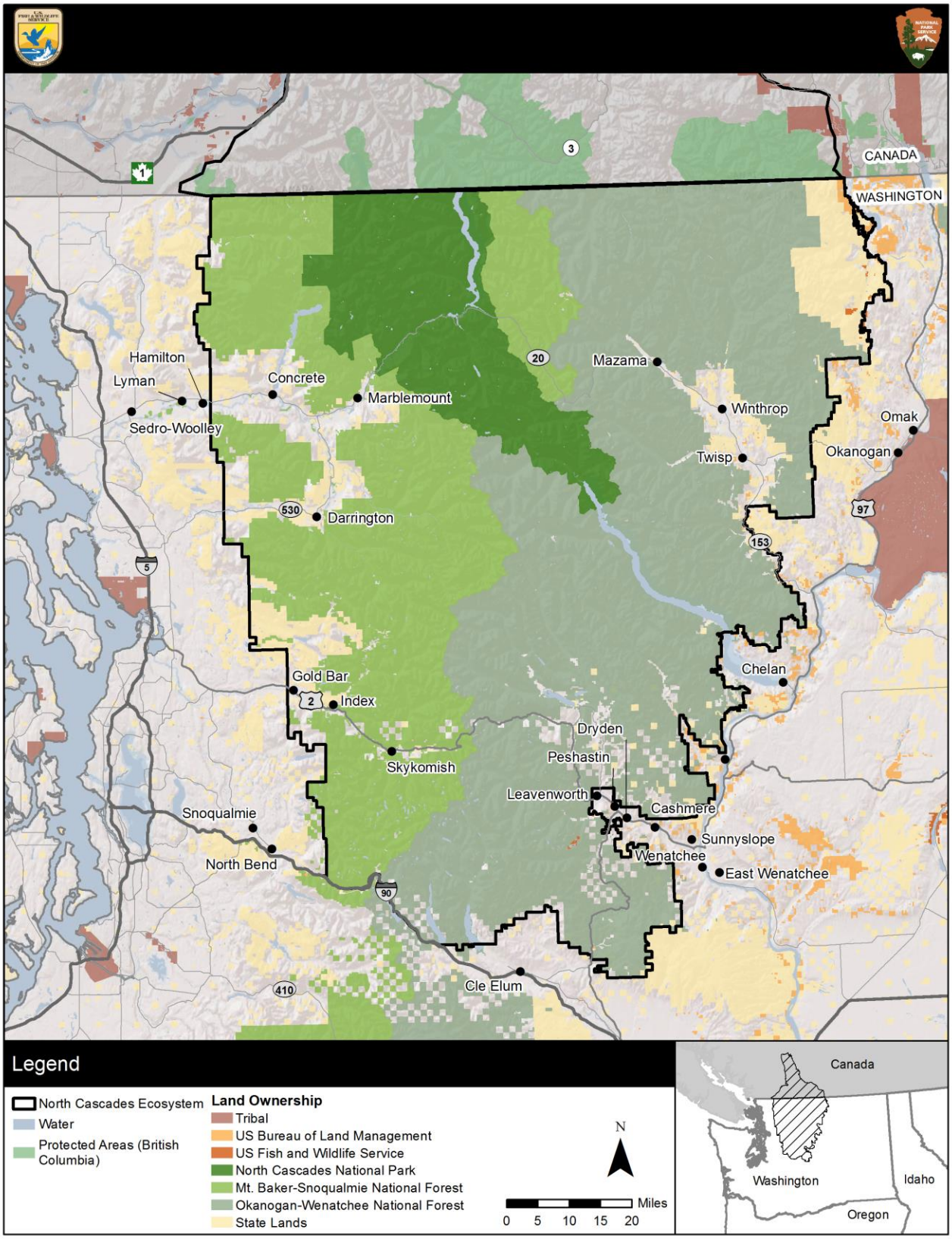

FIGURE 8. GATEWAY COMMUNITIES IN THE NORTH CASCADES ECOSYSTEM

Table 7 provides a list of gateway communities within the ROI, and respective population counts.

TABLE 7. POPULATION OF GATEWAY COMMUNITIES IN OR ADJACENT TO THE NORTH CASCADES ECOSYSTEM

Name	Population (2010-2014)
Cashmere	3,118
Chelan	3,890
Cle Elum	1,872
Concrete	705
Darrington	1,347
Dryden	N/A*
East Wenatchee	13,403
Entiat	1,259
Gold Bar	2,328
Hamilton	301
Index	196
Leavenworth	1,965
Lyman	438
Marblemount	203
Mazama	N/A*
North Bend	5,951
Okanogan	2,552
Omak	4,845
Peshastin	N/A*
Sedro-Woolley	10,540
Skykomish	133
Snoqualmie	11,087
Sunnyslope	3,572
Twisp	919
Wenatchee	31,925
Winthrop	394

Source: U.S. Census Bureau 2013

*Note: *Note: The Census does not provide population data for the towns of Dryden, Mazama, or Peshastin in the state of Washington. Population statistics are presented as the annual average population between 2010 and 2014.

Tourism

Travel spending in Washington State generated $1.8 billion in local, state, and federal tax revenues in 2011 (Dean Runyan Associates 2012). This spending includes dollars spent on gas, lodging, photography, hunting, horseback riding, camping, or food services. Nearly 200,000 jobs are supported in Washington State as a result of outdoor recreation spending. A total of about 122,600 jobs, or about 62%, are from

expenditures associated with outdoor recreation on public lands (Earth Economics 2015). As described in the "Visitor Use and Recreational Experience" section, both Mt. Baker-Snoqualmie National Forest and Okanogan-Wenatchee National Forest offer horseback riding and stock trails and designated areas (USFS 2016d). The WDFW issues hunting permits for both national forests and Lake Chelan and Ross Lake Recreation Areas, which include several game management units within the NCE (USFS 2016e). Tourism spending associated with hunting and horseback riding supports local jobs and income in the ROI.

An NPS report shows that there were 769,837 visitors to the park complex in 2014, and that these visitors spent $33,534,400 in gateway communities near the park complex (NPS 2015h). That spending supported 416 jobs in the local area and had an aggregate benefit to the local economy of $40,582,400. According to the report, most park visitor spending was for lodging (30.6%) followed by food and beverages (20.3%), gas and oil (11.9%), admissions and fees (10.2%) and souvenirs and other expenses (9.9%) (NPS 2015h). Spending segments differed markedly in the amount of spending per party. In general, visitors from outside the local area spent more than those from the local area. Visitors on overnight trips away from home typically incur lodging expenses (hotel or campground fees), whereas those on day trips do not. Overnight visitors also generally need to purchase more food and fuel during their trip than those on day trips (NPS 2015h). Many people use State Highway 20 as a route to travel east to west through the mountains, coincidentally passing through the park complex, and being counted as visitors.

Agriculture and Livestock Grazing

There were 9,396 farms in the ROI in 2012. This represents approximately one quarter of the total number of farms in the State of Washington (37,249) in that year. Washington had approximately 14.7 million acres of land dedicated to farming in 2012, while the ROI had approximately 1.8 million acres or 12.2% of the state's total acreage (USDA 2012). Within the NCE, agricultural operations exist along low-lying valley bottoms and consist primarily of irrigated pasture land, alfalfa, wheat, some corn, and other feed crops in western areas and fruit orchards along the eastern border of the ecoregion (USGS 2016b).

In 2012, there were 11,861 cattle and calf farms in the State of Washington with 1,162,792 head of cattle. Within the ROI, there were 3,004 cattle and calf farms with 221,884 head of cattle in that same year. Net cash farm income from operations equaled $147.5 million in 2012 in the ROI, compared to $1.75 billion for the State of Washington. The average net cash farm income from operations per farm in the ROI was just under $17,000. This is approximately one third of the average net cash farm income from operations per farm in the State of Washington (~$47,000) (USDA 2012).

As of 2015, 773,788 acres of land were actively leased for cattle and sheep grazing on Okanogan-Wenatchee National Forest. Leases were distributed among six ranger districts: Methow Valley, Tonasket, Entiat, Wenatchee River, Cle Elum, and Naches. The majority of the acreage under lease for grazing within the NCE (320,044 acres) was in the Methow Valley Ranger District. The Chelan District has nine grazing allotments, but they are all currently vacant (no permit). Most of the acreage leased on Okanogan-Wenatchee National Forest was for cattle grazing. The annual grazing fee in 2015 was $1.69 per animal unit month (AUM). One AUM is defined as the amount of forage required to feed an animal unit for 1 month. Fees for 2016 were $2.11 per AUM. There are no grazing leases on Mt. Baker-Snoqualmie National Forest.

The 2015 Okanogan-Wenatchee Allotment Information Sheet reported that on national forests within the NCE, there are 4,151 AUMs of permitted sheep and 47,686 AUMS of permitted cattle grazing. Currently 4,100 ewe/lamb pairs graze and there is authorization for 4,552 cow/calf pairs to graze during the summer on National Forest Service allotments within the NCE. No livestock are present within the park complex. Figure 9 details agricultural leases located within the NCE.

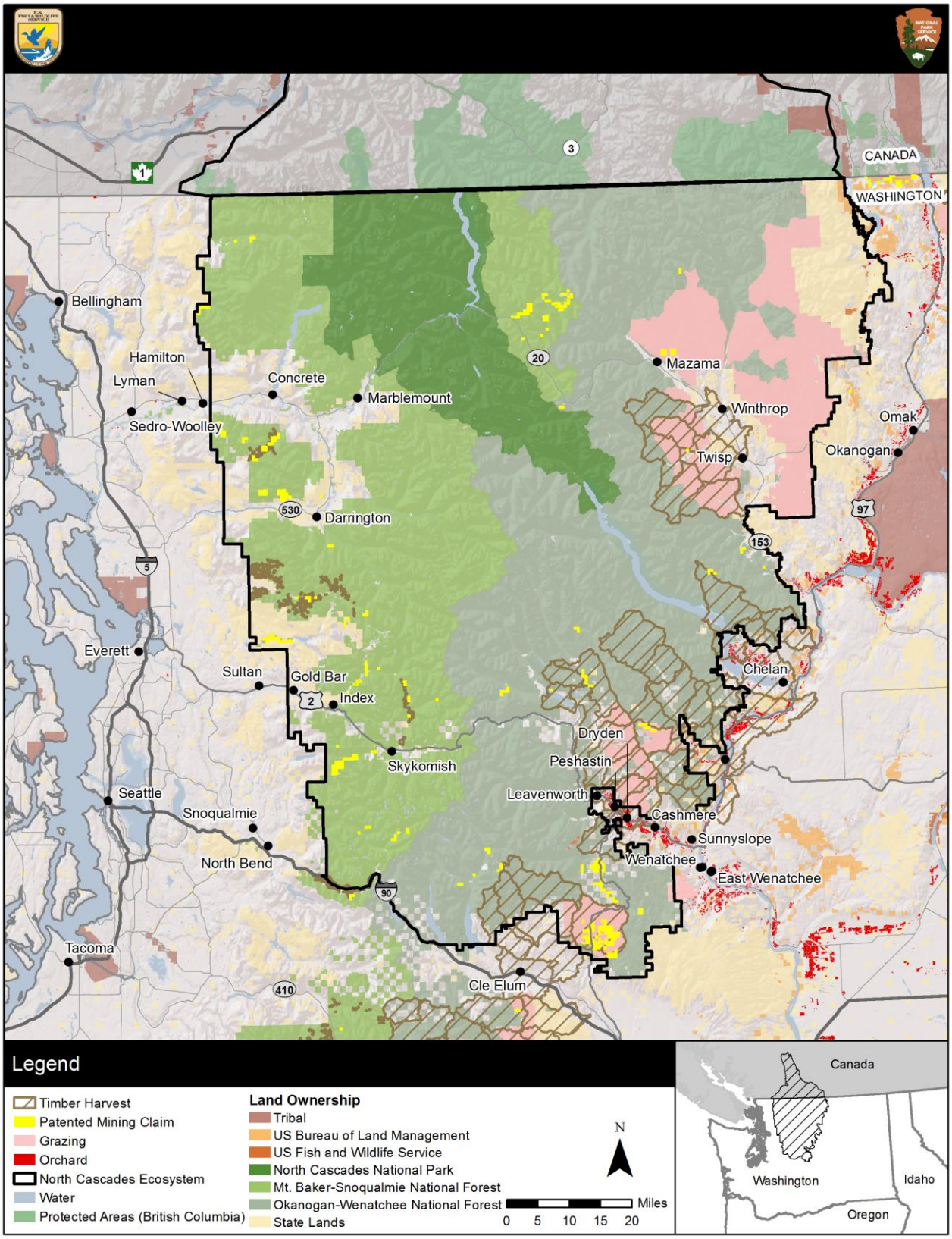

FIGURE 9. ECONOMIC ACTIVITY IN THE NORTH CASCADES ECOSYSTEM

Timber Harvest

Since 2010, the annual volume of timber harvested within Mt. Baker-Snoqualmie National Forest has varied from a low of approximately 7.2 million board feet to a high of approximately 17.7 million board feet, averaging approximately 10.2 million board feet per year. Annual timber sale values, over the same time period, reached a low of $236,420 and high of $1,965,025, averaging $920,768 per year. Based on USFS projections, approximately 8.0 million board feet of timber is estimated to be harvested in 2016. Timber harvest activity on these lands will include thinning and regeneration of early seral forest habitat (Plumage pers. comm. 2016a). In the 10-year period between 2006 through 2015, the annual volume of timber harvested within Okanogan-Wenatchee National Forest varied from a low of 22.3 million board feet in 2014 to a high of 54 million board feet in 2008, averaging 39.4 million board feet per year. Annual timber sales over the same period reach a low of $689,954 in 2015 and a high of $3,266,667 in 2006 (Rohrer pers. comm. 2016).

Timber harvest occurs to a greater extent on private lands at lower elevations along the periphery of the ecosystem, rather than on federal lands. This is due in part to conservation policies and federal endangered species protection. According to U.S. Geological Survey, there has been a general decline in logging activity since 1992 (USGS 2016b). Figure 9 details timber harvest leases located within the NCE. Additionally, a number of private companies have timber operations located within or close to the northwestern NCE, including Weyerhaeuser, Sierra Pacific Industries, Hampton Lumber Company, and Merrill and Ring.

Mining

Locatable minerals are those minerals which, when found in valuable deposits, can be acquired under the General Mining Laws of 1872 (as amended). Examples of locatable minerals occurring on Mt. Baker-Snoqualmie National Forest include copper, gold, molybdenum, tungsten, olivine, chromite, nickel, zinc, silver, lead, and uncommon varieties of limestone, gemstones, and other minerals having unique and special values (Plumage pers. comm. 2016b).

Mt. Baker-Snoqualmie National Forest has a history of mining, dating back to the late 1800s. A total of 148,187 acres within the forest have a moderate to high potential for development of locatable minerals (USFS 1990). There are currently approximately 207 unpatented mining claims (Plumage pers. comm. 2016b) on the forest, with the majority of these being located in the Middle and North Fork Snoqualmie, Finney Block, Sultan Basin, and the Twin Sisters area. Approximately 60 unpatented mining claims are within grizzly bear core habitat (Plumage pers. comm. 2016b).

There are more than 13,000 mining claims on Okanogan-Wenatchee National Forest, covering more than 250,000 acres. Mineral resources on Okanogan-Wenatchee National Forest include but are not limited to asbestos, coal, copper, geothermal, gold, iron, lead, limestone, oil and gas, sand and gravel, silver, stone, and zinc. Additionally, more than 375,000 tons of sand, gravel, and stone are mined on Okanogan-Wenatchee National Forest annually (Rohrer pers. comm. 2016). Figure 9 details mining claims with the NCE.

ETHNOGRAPHIC RESOURCES

Archaeological evidence from the northern Cascades indicates that the area has been occupied for more than 9,600 years (NPS 2012c). Evidence for long-term use of the Cascades comes from the Cascade Pass archaeological site, the oldest radiocarbon dated site (9,600 years ago) in the park complex and the oldest known alpine site in the state of Washington (NPS 2011c). It is also evident in the Ross Lake area where hydropower development has led to more intensive archaeological research than in other interior areas of

the Cascades (NPS 2012c). Although there are few recorded sites within the interior, likely due to limited survey efforts, this area of the Cascades was important for Native American people who relied on the ecosystem for resources and was likely heavily used on a seasonal basis. Okanogan-Wenatchee National Forest has documented more than 2,500 heritage resources on its lands. These resources include seasonal hunting, gathering and fishing camps as well as large permanent villages associated with past Native American people. The archaeological record on the national forests supports the use of the Cascades as far back as 9,000 years ago with permanent villages being established 2,000–3,000 years ago.

Native American people inhabited the Cascades when Euro-American people arrived in the 1800s and continue to reside in and/or utilize resources within the area up to the present day. In 1855, two treaties were negotiated by Governor Isaac I. Stevens, the Treaty of Point Elliot and the Treaty with the Yakama, in order to move the tribes onto reservations (Boxberger 1996). Governor Stevens had been directed to consolidate the tribes on as few reservations as possible; therefore, the reservations created through these treaties are often occupied by a confederation of tribes (Boxberger 1996). Both of these treaties include a "subsistence clause," which allowed the signatory tribes to fish at all "usual and accustomed places" and to hunt and gather on "open and unclaimed lands" that had been ceded to the U.S. government as part of the treaty (Boxberger 1996). The Confederated Tribes of the Colville Reservation are the only tribe not covered by either of these treaties. Instead, they were recognized through an executive order in 1872.

The descendants of the peoples who traditionally used the northern Cascades prehistorically and historically now reside within the following tribes: the Confederated Tribes of the Colville Reservation, the Lummi Nation, the Muckleshoot Indian Tribe, Nooksack Indian Tribe, Sauk-Suiattle Indian Tribe, the Swinomish Indian Tribal Community, the Snoqualmie Tribe, the Stillaguamish Tribe of Indians, the Tulalip Tribe, the Upper Skagit Tribe, the Yakama Indian Nation, Suquamish Tribe, and the Samish Indian Nation. These tribes retain important ties to the northern Cascades either through continued use of the lands for traditional practices (e.g., hunting and fishing, ceremonies, etc.) and/or through connections to the land that are documented in oral histories that continue to be important for tribal practices. All treaty tribes retain rights to hunt and gather on their ceded lands where it is consistent with existing management. Also, the NPS has recently changed its regulations to allow all federally recognized tribes to gather plants for traditional use following the development of an agreement between the park and tribe (81 *Federal Register* [FR] 45024–45039, 2016).

Ethnographic resources are defined as "landscapes, objects, plants and animals, or sites and structures that are important to a people's sense of purpose or way of life" (NPS 2016f). These resources are defined by the community to which they are important. The tribes that maintain connections to the northern Cascades have documented ethnographic resources within North Cascades National Park and the Ross Lake and Lake Chelan National Recreation Areas. These types of resources are likely present within USFS lands but the USFS does not use the same terminology; instead they are likely documented as heritage resources or traditional cultural properties. Previous research indicates that other ethnographic resources, such as traditional gathering, hunting and fishing areas, or areas of spiritual or ceremonial use, are also likely present within the northern Cascades (Boxberger 1996; Ford 1993).

In addition to the types of resources above, ethnographic resources can include animals that are important to a community's way of life, such as those that serve a prominent role in oral histories and continuing cultural traditions (e.g., are hunted for meat and hides or to obtain parts important for ceremonies). The grizzly bear is an important part of tribal culture and history in the Pacific Northwest, and it is anticipated that the grizzly bear itself is an ethnographic resource to the Native American people who maintain connections to the northern Cascades. Therefore, the decline or restoration of grizzly bears would likely affect these people in various ways. While the tribes that reside on the west and east sides of the range are culturally different, the grizzly bear is considered important by each group. This importance is documented in the archaeological record, via ethnographic resources, and in the oral histories of the tribes

(Clark 1963; Collins 1974; Ford 1993; Hallowell 1926; Hill-Tout and Maud 1978; Lyman 1986). Grizzly bears were hunted for food, pelts, and ritual objects (e.g., claws and teeth) and were important for tribal ceremonies (Ford 1993; Hallowell 1926). Additionally, the importance of the grizzly bear is reflected in traditional place names within the NCE.

The skeletal remains of grizzlies have been identified in the archaeological record of eastern Washington. A 1986 study by Lee Lyman identified grizzly bear skeletal remains in five archaeological sites that dated from 9000 Before Present to as recent as 850 Before Present. Some of these remains were found in archaeological sites outside of what is considered the traditional territory of the grizzly bear (Lyman 1986). Lyman notes that in more recent period, the Native American groups living in eastern Washington hunted both black and grizzly bears for meat and hides but that the grizzly bear was considered important for ceremonial purposes (Lyman 1986). Therefore, the bones may have been obtained within the traditional territory of the grizzly bear and transported to other places. That remains were only found in five sites does not mean that the grizzly bear was not used by Native American people elsewhere; instead it is likely related to the amount of archaeological research conducted in some areas and the unlikelihood that faunal remains were preserved within the record.

The importance of the grizzly bear to Native American people is documented in ethnographic literature. A 1926 dissertation on the importance of the grizzly bear to Native people in the Northern Hemisphere relies on ethnographic information to detail how people hunted grizzly bears, the linguistics associated with the animal, and ceremonies that featured the grizzly bear, to name a few topics (Hallowell 1926). This research detailed the importance of the grizzly bear to the people of the Northwest coast as well as the interior Columbia Plateau area (Hallowell 1926). Not only does this research provide information on the use of grizzlies at the time that Euro Americans came in contact with Native Peoples, it also includes discussions on the portrayal of grizzlies in oral histories within each geographic area. The grizzly bear features prominently in several Northwest Native American oral histories, some of which have been published (see Hill-Tout and Maud 1978 and Clark 1963) and others which have been gathered during oral history projects like that completed by Western Washington University between 1963 and 1973 (Archives West 2016).

The most important sources of information on ethnographic resources are the tribes themselves. The presence of ethnographic resources and the potential impacts of the proposed alternatives on those resources are determined by the tribes that continue to use the area. The FWS and NPS have initiated consultation with the tribes listed above regarding this project and consultation is ongoing. A letter was sent to every federally recognized tribe in Washington State. The potential safety impacts on tribal members hunting or gathering within the NCE are considered to be the same as those for other visitors and are addressed in “Public and Employee Safety.”

Chapter 4:

ENVIRONMENTAL CONSEQUENCES

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This "Environmental Consequences" chapter analyzes the beneficial and adverse impacts that would result from implementation of any of the alternatives considered in this *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (draft plan/EIS). The resource topics presented in this chapter correspond to the descriptions of existing conditions in "Chapter 3: Affected Environment."

GENERAL METHODOLOGY FOR ASSESSING IMPACTS

The following analysis evaluates direct, indirect, and cumulative impacts on the human environment physical, natural, cultural, and socioeconomic resources) from the grizzly bear restoration alternatives described in chapter 2. The approach includes the following elements:

- Focusing the analysis to the greatest extent possible on management changes and associated issues that could have meaningful impacts on the resources or values being evaluated.
- Using general analysis methods and assumptions that follow the Council on Environmental Quality (CEQ) and U.S. Department of the Interior regulations and guidance.

The potential for significant impacts from management activities are assessed and described in each resource topic as applicable.

GENERAL ANALYSIS METHODOLOGY AND ASSUMPTIONS

The interdisciplinary planning team reviewed a substantial body of scientific literature and studies applicable to the North Cascades Ecosystem (NCE) and associated resources. This information augmented observations and documentation gathered by National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), U.S. Forest Service (USFS), and Washington Department of Fish and Wildlife (WDFW) personnel to support the qualitative and quantitative statements presented for each impact topic. When available, the methodology notes other resource-specific data, observations, or studies for each impact topic. The analysis focuses on expected environmental impacts related to the implementation of grizzly bear restoration activities.

Assessing Impacts Using Council on Environmental Quality Criteria

According to the CEQ National Environmental Policy Act (NEPA) regulations (40 Code of Federal Regulations [CFR] 1500–1508), the term "significant" is based on the criteria of context and intensity (40 CFR 1508.27).

Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects within the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

Intensity. This refers to the severity or magnitude of an impact. The CEQ identifies 10 factors to be considered in evaluating the intensity of an impact. For more information, see 40 CFR 1508.27(b).

Assumptions

The following guiding assumptions were used to provide context for this analysis.

Analysis Period. This draft plan/EIS establishes goals, objectives, and specific implementation actions needed to restore grizzly bears to the NCE. For all action alternatives, the majority of initial management actions would likely occur within 5 to 25 years of implementation, with most of the impacts being greatest during this period. However, this plan would guide land managers into the future, as additional management actions are needed. To understand the potential long-term impacts associated with grizzly bear restoration, the analysis considers actions over the anticipated lifespan of this draft plan/EIS and beyond, during which time impacts could continue periodically. Management may continue into the future without additional NEPA analysis as long as there no "substantial changes in the proposed action that are relevant to environmental concerns; or … significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts" (40 CFR 1502.9(c)).

The analysis of alternative B focuses on the primary phase of restoration—the release of up to 10 bears over 2 years with subsequent monitoring. The adaptive management phase of alternative B could include the release of additional bears to achieve an initial population of 25 grizzly bears; however, if pursued, impacts would be similar to alternative C. If the decision is made to repeat the primary phase of alternative B, impacts would be the same as those described for the initial releases.

Analysis Area. The area of analysis generally focuses on the NCE grizzly bear recovery zone as described in the North Cascades Ecosystem Recovery Plan chapter of the FWS *Grizzly Bear Recovery Plan* (FWS 1997). The 6.1 million acre (9,565 square mile) recovery zone includes all of the North Cascades National Park Service Complex (park complex) and most of the adjacent Okanogan-Wenatchee and Mt. Baker-Snoqualmie National Forests, along with small amounts of interspersed state and private land. Impacts are considered either localized (i.e., occurring in limited areas) or widespread (i.e., occurring over the entire area of analysis). For some impact topics, the area of analysis varies slightly and is further defined in those specific topics. References to "the NCE" are assumed to pertain specifically to the recovery zone as described above. Several resource topics also consider impacts in areas outside the NCE related to actions or impacts that may occur if bears move beyond the NCE.

Duration and Type of Impacts. Duration describes the length of time over which an effect may occur. For example, impacts could occur over minutes, days, months, or years. The analysis includes a description of the time frame over which impacts are expected to occur. In general, for all alternatives, impacts are considered and analyzed based on whether they would take place during the primary phase of grizzly bear restoration, anticipated to last between approximately 5 and 25 years depending on the action alternative, or whether they would persist beyond the primary restoration phase.

Type describes the classification of the impact as beneficial or adverse:

- **Beneficial.** A change in the condition or appearance of the resource that moves the resource toward a desired condition.
- **Adverse.** A change in the condition or appearance of the resource that moves the resource away from a desired condition or detracts from its appearance or condition.

Jurisdiction and Compliance

The NPS and FWS are the lead agencies for this planning process, whereas the USFS and WDFW are participating as cooperating agencies. The NPS has jurisdiction over NPS lands; however, the NPS must also consider the impacts of its actions on adjacent lands. The FWS has jurisdiction over the implementation of the *Endangered Species Act* (ESA), including the conservation of listed species such as the grizzly bear. The USFS has jurisdiction over national forest lands, and the lead agencies must coordinate with the USFS to engage in any grizzly bear restoration actions on its land. As such, compliance with all USFS laws, regulations, and policies would be required (see appendix B and appendix C). In addition, the WDFW could be involved with grizzly bear monitoring and maintenance activities, depending on the alternative ultimately selected, and would need to comply with its laws, regulations, and policies as appropriate.

CUMULATIVE IMPACTS

The CEQ regulations for implementing NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). All alternatives, including the no-action alternative, consider cumulative impacts.

Cumulative impacts were determined by combining the impacts of each alternative with the impacts of other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future projects and plans within the area of analysis, and if applicable, the surrounding region. Past actions are those that have occurred or have been occurring in the NCE, and reasonably foreseeable future projects are those that are likely to occur within the life of the plan. Following the CEQ guidance, past actions were included, "to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for the actions and its alternatives may have a continuing, additive, and significant relationship to those effects" (CEQ, Connaughton, pers. comm., 2005).

The cumulative impact analysis used the following four steps:

- Step 1 — Identify Resources Affected

  Fully identify resources affected by any of the alternatives. These include the resources addressed as impact topics in chapters 3 and 4 (this chapter) of this document.

- Step 2 — Set Boundaries

  Identify an appropriate spatial and temporal boundary for each resource. For example, the temporal boundaries extend from when areas were developed for hydroelectric purposes (because the development flooded available grizzly bear habitat) through the life of the plan (limited to those future actions where impacts could be reasonably predicted). The spatial boundary is the NCE unless otherwise described under each resource topic. Some actions located adjacent to but outside the NCE are also listed in order to consider potential future grizzly bear movements.

- Step 3 — Identify Cumulative Action Scenario

  Determine which past, present, and reasonably foreseeable future actions to include for each resource. Reasonably foreseeable future actions include those federal and nonfederal activities not yet undertaken, but sufficiently likely to occur, that a reasonable official would take such

activities into account in reaching a decision. These activities include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite (43 CFR 46.30).

- Step 4 — Cumulative Impact Analysis

  Assess impacts of these other actions plus impacts of each alternative, to arrive at the total cumulative impact of each alternative and each alternatives contribution. This analysis is included for each resource in this chapter.

Past, Present, and Reasonably Foreseeable Actions in the North Cascades National Park Service Complex

Past, present, and reasonably foreseeable future projects or plans within the NCE and, if applicable, the surrounding region were identified through consultation with lead and cooperating agency personnel and through the public scoping process to provide the cumulative impact scenario. Similar to the analysis of impacts of the alternatives, the cumulative impacts analysis focuses on cumulative actions within the area of analysis, but also includes actions within the surrounding region as they apply to specific impact topics.

Impoundments for Hydroelectric Development. The Skagit River Hydroelectric Project, owned and operated by Seattle City Light, is a series of hydroelectric dams and associated impoundments on the Skagit River that has resulted in the inundation of riparian habitat along the river. The Lake Chelan Dam, which raised the level of the lake, has resulted in the inundation of additional wetlands and riparian habitat at the head of the lake. In all, approximately 29,800 acres of riparian habitat, which historically provided important spring foraging habitat for grizzly bears, have been inundated within the park complex.

Ongoing Wildlife Monitoring Efforts. The NPS and WDFW have a number of camera stations in the park complex, some with lures, to track larger carnivores.

Fisher Restoration. The *NPS Fisher Restoration Environmental Assessment* (NPS 2015i) sets out a plan to restore the Pacific fisher to the park complex, reintroducing 80 fishers within 2 years and then tracking fishers with fixed-wing aircraft (telemetry) for 3 years and following up with camera and hair snare monitoring.

Ongoing Trail Maintenance and Repairs. The trail network in the park complex includes a total of approximately 390 miles of trail and 130 backcountry camps, including various types of creek crossings/bridges, drainage structures, trail and camp signs, tent pads, fire grates and pits, wallowa and composting toilets, and hitchrails. A majority of these facilities receive some form of maintenance every year, most of which occurs between May 1 and September 30. Actions associated with this include, among others:

- opening the trail corridor, including brushing and removing fallen trees, debris, and rocks from the trail corridor;
- removing hazard trees near backcountry camps and historic structures; and
- completing minor (200 feet or less) trail relocations due to seasonal changes in the landscape, such as rockslides, erosion, and downed trees.

Some of this work requires helicopter use.

Invasive Plant Management within Wilderness. The *North Cascades National Park Service Complex Invasive Plant Management Plan and Environmental Assessment* (NPS 2012d) calls for invasive plant treatments within wilderness. Some of this work also includes helicopter flights.

Mountain Lakes Restoration (fish removal). The *North Cascades National Park Service Complex Mountain Lakes Fishery Management Plan / Environmental Impact Statement* (NPS 2008a) calls for restoration of mountain lakes through fish removal efforts (gill netting and piscicide use in some lakes). Some of this work also includes helicopter flights. Subsequent legislation (the *North Cascades National Park Service Complex Fish Stocking Act*, 2014) allows for the stocking of fish in selected lakes in the park complex.

Fire Management Operations. NPS fire management operations within the park complex include fire suppression and wildland fire management. Some of this work includes flights by helicopters and fixed-wing aircraft, which would result in noise impacts and could also result in the possible transfer of invasive terrestrial organisms (plant or animal) due to plants or seeds on gear or skids or invasive aquatic organisms via bucket drops.

***Ross Lake National Recreation Area General Management Plan*.** The *Ross Lake National Recreation Area General Management Plan* (GMP) is a programmatic plan that addresses management of front country facilities and visitor use management in Ross Lake National Recreation Area. Actions include a number of possible new trails and relocation of the Thornton Lakes Trailhead to an area outside of wilderness. The Ross Lake GMP also established a long-term policy for grizzly bear core area management for the entire complex.

***Stephen Mather Wilderness Management Plan*.** The *Stephen Mather Wilderness Management Plan* (NPS 1989) is a programmatic plan that addresses visitor use management in the backcountry.

Stehekin River Corridor Implementation Plan (NPS 2013b). The plan analyzed a range of alternatives to respond to the increased magnitude and frequency of flooding in the Stehekin River corridor within Lake Chelan National Recreation Area. The preferred alternative outlined major road reroutes, erosion abatement measures, and a process for private/federal land exchanges to move prioritized private parcels out of the floodplain. The primary action related to this plan with the potential to affect grizzly bears is a 2-mile reroute of the lower Stehekin Valley Road, to remove it from the Stehekin River floodplain and place it upslope. To date, this reroute has not been funded, nor is there any identified funding available for it. The impacts on grizzly habitat would likely be small.

Administrative Flights for Search and Rescue Operations. Administrative overflights for search and rescue operations occur intermittently as needed. These can affect solitude in wilderness areas and also carry a potential risk of invasive plant transmission from landing helicopters in backcountry areas.

Black Bear Management. Ongoing black bear management activities on NPS lands include but are not limited to public outreach and education, placement of signage at visitor centers and trailheads, sanitation measures such as installation of bear-resistant trash receptacles and food lockers at campgrounds, and backcountry food storage requirements. Aversive conditioning and, very rarely, temporary backcountry camp closures are also used in black bear management.

Past, Present, and Reasonably Foreseeable Actions on National Forest Lands

Forest Vegetation Management. Forest vegetation management activities include timber harvest, fuels management, thinning, restoration, and special forest product collection. There are multiple forest

vegetation management projects on each district of Okanogan-Wenatchee National Forest as well as one to two vegetation management projects on Mt. Baker-Snoqualmie National Forest each year.

Cattle and Sheep Grazing. No active allotments are located near potential release areas within the NCE. It is unlikely that USFS would reactivate any vacant allotments if they are near proposed grizzly bear release sites. However, grazing does occur in the NCE along its eastern boundary in Okanogan-Wenatchee National Forest and on private lands.

Motorized Travel Management Projects. For both forests, motorized travel management projects result in a change from a policy of "everything open to motorized use unless designated closed" to "everything closed to motorized use unless designated open."

Mining. Ongoing mining operations on USFS lands in the NCE include the following:

- Olivine Mine, Mt. Baker-Snoqualmie National Forest. Operations include excavating, blasting, crushing, and hauling of ore; a future plan includes a 10-acre expansion.
- Purple Hope Mine, Mt. Baker-Snoqualmie National Forest. Operations include extraction, blasting, packing, and flying material off site.
- Buckhorn Mine, Okanogan-Wenatchee National Forest (located on east side of Tonasket District outside the recovery zone).
- Over 200 small-scale mining claims across both forests; operations include suction dredging, panning, prospecting, test pit exploration, and mineral and geothermal exploration projects.

Reasonably foreseeable mining operations on USFS lands in the NCE include the following:

- Flagg Mountain Exploratory Drilling on Okanogan-Wenatchee National Forest.
- Mt. Baker Geothermal Consent to lease on Mt. Baker-Snoqualmie National Forest. Consent to lease has been offered to Bureau of Land Management, and it is expected to offer parcels for leasing in 2017.
- Department of Natural Resources and U.S. Geological Survey Geothermal Exploration on Mt. Baker-Snoqualmie National Forest.
- None of these existing or reasonably foreseeable mining operations are near potential grizzly bear release areas. Proposals for new mining operations would be evaluated for their potential to affect the grizzly bear core area or result in disturbances to grizzly bears on a case-by-case basis through the environmental review and permitting process.

Ski Area Expansion Projects. Planned ski area expansion projects on USFS land that could have cumulative impacts on some of the resources considered in this draft plan/EIS include the following:

- Expansion of Nordic ski trails at White Pass Ski Area on Okanogan-Wenatchee National Forest (Naches District, outside the NCE grizzly bear recovery zone).
- Expansion of existing parking lots at Mt. Baker and Stevens Pass Ski Areas on Mt. Baker-Snoqualmie National Forest.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Mine Cleanup and Abandoned Mine Lands Projects. Ongoing CERCLA mine cleanup projects in the NCE include the following:

- Holden Mine (Okanogan-Wenatchee National Forest);
- Monte Cristo Mine (Mt. Baker-Snoqualmie National Forest);
- Index Shooting Range (Mt. Baker-Snoqualmie National Forest); and
- Cashman Millsite (Mt. Baker-Snoqualmie National Forest).

Reasonably foreseeable future CERCLA mine cleanup projects in the NCE include the following:

- Copper City Mine (Okanogan-Wenatchee National Forest, Naches District, outside the recovery zone); and
- Sunset Mine (Mt. Baker-Snoqualmie National Forest).

Ongoing Trail Maintenance. Ongoing trail maintenance projects include logout, tread, and drainage structure maintenance on existing trail systems throughout both forests.

Ongoing Road Maintenance. Ongoing road maintenance projects include minor erosion damage repair, brushing, and surface and drainage structure maintenance of existing road systems on both forests.

Invasive Plant Management. Invasive plant management activities include hand-pulling, mowing, and herbicide application to existing and newly discovered weed populations on both forests.

Special Use Permit Issuance. USFS issues special-use permits for a number of different types of uses on both forests, including outfitter-guide use, road-use, communication towers, recreational events, and other types of activities. These include both existing multiple year permits and future annual permits.

River/Aquatic Restoration. River and aquatic restoration projects are occurring and planned on most, if not all, districts on both forests. These include fish passage barrier removals, large woody debris additions, side channel reconnection, riparian tree/shrub plantings, dike removals, road decommissioning, and other projects.

Fisher Restoration. The WDFW plans to restore the Pacific fisher (*Martes pennant*i) to Mt. Baker-Snoqualmie National Forest. Once fishers are released into the national forest, it is likely that camera stations in would be placed in wilderness areas to monitor fisher populations. Impacts from fisher restoration on national forest lands are expected to be similar to those for fisher restoration on NPS lands.

Mountain Goat Relocation from Olympic National Park. The NPS, in cooperation with the WDFW and the two forests, is proposing to relocate mountain goats from Olympic National Park to suitable habitats on Mt. Baker-Snoqualmie and Okanogan-Wenatchee National Forests. Some of the staging areas proposed for this project could also be used for grizzly bear restoration activities. In addition, some of the release sites on Mt. Baker-Snoqualmie National Forest may be in wilderness.

***Domestic/Bighorn Sheep Interaction Environmental Impact Statement*.** This environmental impact statement (EIS) will provide guidance for revising allotment management plans for all 13 domestic sheep allotments on Okanogan-Wenatchee National Forest, with emphasis on risk of contact between domestic and bighorn sheep and potential for disease transmission.

State Authorized Hunting and Fishing. The WDFW licenses recreational hunting and fishing within the state of Washington. Hunting is prohibited in the park complex but occurs on both Mt. Baker-Snoqualmie and Okanogan-Wenatchee National Forests as well as in the Ross Lake and Lake Chelan National Recreation Areas. Hunting seasons that overlap with proposed grizzly bear restoration activities (i.e., ungulate [deer and elk] and black bear seasons) could contribute to cumulative impacts. Fishing seasons could contribute increased pressure on fish resources as well.

Tribal Hunting, Fishing, and Gathering. A number of tribes conduct hunting, fishing, and gathering occurs on the national forests in accordance with their reserved treaty rights. A number of tribes have a wildlife co-management agreement with the WDFW for hunting species like deer, elk, and mountain goats, among others. Tribal members also harvest fish, like salmon and trout, and plants and berries, like salal and huckleberry.

Other Past, Present, and Reasonably Foreseeable Actions

Interstate 90 Expansion. The reconstruction of Interstate 90 over Snoqualmie Pass will involve an increased number of traffic lanes and construction of over and under-passes for terrestrial and aquatic organisms.

Commercial, Military, and Private Overflights. Overflights of the NCE by military, commercial, and private aircraft would occur throughout the lifespan of this draft plan/EIS. These flights increase the amount of audible noise within the NCE and could result in impacts on park and forest resources including wilderness, wildlife and wildlife habitat, and visitor use and recreational experience.

Cumulative Impact Scenario

Table 8 provides a matrix of the cumulative actions being considered and those resource topics that they could affect.

TABLE 8. CUMULATIVE ACTIONS AND POTENTIAL IMPACTS ON RESOURCES IN THE PROJECT AREA

Cumulative Action	Impact Topic: Grizzly Bears	Other Wildlife, Fish,	Wilderness Character	Visitor Use and Recreational Experience	Public and Employee Safety	Socioeconomics	Ethnographic Resources
Actions in the Park Complex							
Impoundments for Hydroelectric Development	X	X		X			X
Ongoing Wildlife Monitoring Efforts	X	X	X				
Fisher Restoration	X	X	X	X			
Ongoing Trail Maintenance and Repairs	X	X	X	X	X		
Invasive Plant Management within Wilderness		X	X				
Mountain Lakes Restoration (fish removal) and Act		X	X	X	X		
Fire Management Operations	X	X	X	X	X	X	
Ross Lake National Recreation Area General Management Plan			X	X			

Cumulative Action	Impact Topic						
	Grizzly Bears	Other Wildlife, Fish,	Wilderness Character	Visitor Use and Recreational Experience	Public and Employee Safety	Socioeconomics	Ethnographic Resources
Stephen Mather Wilderness Management Plan			X	X			
Stehekin River Corridor Implementation Plan	X	X		X	X	X	
Administrative flights for Search and Rescue operations	X	X	X	X	X		
Black Bear Management	X	X	X	X	X		
Actions on National Forest Lands in the NCE							
Forest Vegetation Management	X	X		X		X	X
Cattle and Sheep Grazing	X	X	X	X		X	X
Motorized Travel Management Projects	X	X		X		X	X
Mining	X	X	X	X		X	X
CERCLA Mine Cleanup and Abandoned Mine Lands Projects	X	X	X		X	X	X
Ski Area Expansion Projects	X	X		X		X	X
Forest Plan Updates	X	X	X	X	X	X	
Ongoing Trail Maintenance	X	X	X	X		X	
Ongoing Road Maintenance	X	X		X	X		
Wildfire Suppression	X	X	X	X	X	X	X
Invasive Plant Management		X					
Special Use Permit Issuance	X	X	X	X		X	
River/Aquatic Restoration	X	X		X			X
Fisher Restoration		X					
Mountain Goat Relocation from Olympic National Park		X	X	X			X
Domestic/Bighorn Sheep Interaction EIS	X	X	X			X	
Tribal Hunting, Fishing and Gathering	X	X		X			X
WDFW Actions in the NCE							
State Authorized Hunting and Fishing	X	X		X			
Monitoring Cameras in Park Complex		X	X				
Other Actions							
Interstate 90 Expansion	X	X				X	
Commercial, military, and private overflights	X	X	X	X			

GRIZZLY BEARS

Methods and Assumptions

Potential impacts on grizzly bears are evaluated qualitatively based on expert resource knowledge and professional judgment. In addition, a review of scientific literature was conducted detailing grizzly bear life history, reproductive biology, diet, habitat use, and other aspects of grizzly bear ecology in various ecosystems throughout North America. The analysis also relies on conclusions reached in a 2016 habitat modeling report regarding grizzly bear carrying capacity in the NCE (Lyons et al. 2016).

Analysis Area. The area of analysis for impacts of the restoration activities is the NCE grizzly bear recovery zone as described in the North Cascades Ecosystem Recovery Plan chapter of the FWS *Grizzly Bear Recovery Plan* (FWS 1997). Additionally, the impacts of capture operations on grizzly bears in source areas are analyzed. Finally, the impacts associated with the management of bears that move outside the NCE are also considered.

Issues Analyzed. The analysis of impacts on grizzly bears under each alternative is based on the following issue statements that are identified in chapter 1:

> **Issue Statement.** Any action to restore grizzly bears in the NCE will have a clear and direct impact on the species.
>
> **Issue Statement.** Long-term adaptive management activities associated with restoration of grizzly bears (including actions associated with additional releases, aversive conditioning, and relocation or removal of conflict grizzly bears), would have an impact on the species.

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

Under alternative A, options for grizzly bear restoration would be limited. Grizzly bears would not be released into the U.S. portion of the NCE, and instead natural emigration from other populations would be the sole source of new grizzly bears to the region. Grizzly bears would not be prevented from moving into the U.S. portion of the NCE from Canada, and any grizzly bears that did move into the NCE would be fully protected as a threatened species under the ESA.

The NCE is isolated from other grizzly bear populations. The nearest populations to the east are in the Kettle-Granby Grizzly Bear Population Unit (GBPU) in British Columbia and the Selkirk Mountains in Washington, Idaho, and British Columbia. Grizzly bears inhabit the remote areas east of Okanogan River and west of the Kettle-Granby Mountains, but the very limited number of detections indicate that the populations are probably limited to a very small number of animals. With careful management, these highlands may become a suitable linkage zone between the Rockies and the Cascades in the long term, but currently and for the foreseeable future, no population pressures exist in these areas that would cause grizzly bears to expand from the east into the Cascades (Braaten et al. 2013).

The nearest population to the north is composed of a small number of individuals in the Stein-Nahatlatch GBPU in British Columbia (Proctor et al. 2012). Farther to the west, grizzly bears in the Squamish-Lillooet and Garibaldi-Pitt GBPUs are likewise not at a population density that would facilitate range expansion into the NCE through dispersal across the major barriers created by Fraser River, the TransCanada Highway, two national railroads, and the high levels of human influence along that corridor (Braaten et al. 2013).

Because of the small number and isolation of NCE grizzly bears, they are believed to be at significant risk of eventual extirpation (North Cascades Grizzly Bear Recovery Team 2004). Biological consensus is that grizzly bears in the NCE will not recover on their own and need some form of human intervention to achieve reproduction and eventual recovery (North Cascades Grizzly Bear Recovery Team 2004; Braaten et al. 2013).

Source Population. Under alternative A, no grizzly bears would be removed from grizzly bear source areas for translocation into the NCE. As a result, no impacts on grizzly bear source populations would occur.

Capture, Release, and Monitoring. Under alternative A, existing management practices would continue, but no new management actions would be implemented beyond those available at the outset of the grizzly bear planning process. No active releases of grizzly bears or their subsequent monitoring would occur. Therefore, no impacts on grizzly bears from capture, release, and monitoring efforts would occur under alternative A.

Cumulative Impacts

Present and ongoing NPS actions with the potential to result in cumulative impacts on grizzly bears include ongoing wildlife monitoring efforts, fisher restoration, ongoing trail maintenance and repairs, invasive plant management within wilderness, mountain lakes restoration and fish stocking per the *North Cascades National Park Service Complex Fish Stocking Act*, fire management operations, the *Stehekin River Corridor Implementation Plan*, and administrative flights for search and rescue operations and other purposes. Present and ongoing USFS actions with the potential to result in cumulative impacts on grizzly bears include forest vegetation management, cattle and sheep grazing, motorized travel management projects, mining, CERCLA mine cleanup and abandoned mine lands projects, ski area expansion projects, forest plan updates, ongoing trail maintenance, ongoing road maintenance, wildfire suppression, invasive plant management, special-use permit issuance, and river and aquatic restoration projects. Other projects with the potential to affect grizzly bears include the Interstate 90 expansion and recreational and tribal hunting.

Ongoing NPS wildlife monitoring efforts and fisher restoration would have little impact on grizzly bears, if present, because most of the activity related to these actions would be non-intrusive, and most impacts would result from human presence engaged in these activities. Invasive plant management within NPS wilderness would have beneficial impacts on grizzly bears, if present, by enhancing native habitat. NPS fire management operations would have beneficial impacts on grizzly bears because they would provide opportunities for habitat enhancement. Finally, the *Stehekin River Corridor Implementation Plan* could have adverse impacts because the reroute of roads and other features of the plan could affect native vegetation and reduce the amount of available habitat for bears.

USFS forest vegetation management projects could have both beneficial and adverse impacts on grizzly bears depending on whether they create opportunities to enhance habitat for certain species. Cattle and sheep grazing on USFS lands could have adverse impacts on grizzly bears if conflicts with grizzly bears occur. Beneficial impacts on grizzly bears could occur from decommissioning roads for a variety of reasons unrelated to grizzly restoration actions in or near sensitive habitat. CERCLA mine cleanup and abandoned mine lands projects on USFS lands would have beneficial impacts on grizzly bears through restoration of habitat. However, ski area expansion projects on USFS lands could have adverse impacts on grizzly bears because the clearing of land could disturb and fragment additional habitat. USFS wildfire suppression efforts could have both beneficial and adverse impacts on grizzly bears because they could reduce the threat of catastrophic wildfires and result in the production of early seral conditions and associated food sources.

The expansion of Interstate 90 could have beneficial impacts on grizzly bears through the creation of wildlife underpasses and overpasses that increase opportunities for dispersal. Recreational and tribal hunting could result in disturbance related to human presence and the potential for mortality related to shooting over misidentification of grizzly bears as black bears. For example, studies in the Greater Yellowstone Ecosystem (GYE) demonstrated that grizzly bear survival was negatively affected by the presence of ungulate (e.g., deer and elk) hunting and the presence of roads and rural development, which occurred more often as bears shifted to lower elevations in search of food (Schwartz, Haroldson, and White 2010). Higher survival was found in bears living in areas closed to hunting and secure from development. It is likely that these factors would similarly affect grizzly bear survival in the NCE.

Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on grizzly bears if present. The decision to not actively restore grizzly bears under alternative A would result in adverse impacts on grizzly bears both if present in the NCE, as well as throughout their range. The eventual loss of grizzly bears from the NCE would continue to put pressure on the species, reducing the likelihood of achieving recovery under the ESA. Although cumulative actions may provide benefits to grizzly bear habitat, the existing very low estimate of bears in the NCE and the decision under alternative A not to restore them would contribute substantially to overall adverse cumulative impacts on grizzly bears.

Conclusion

The implementation of alternative A would not result in any direct short-term, adverse impacts on grizzly bears in the NCE. The tentative restoration goal of 200 grizzly bears in the U.S. portion of the NCE would not be achieved under alternative A because grizzly bears in the NCE would not recover to a sustainable population on their own. Given the extremely small number of bears in adjacent habitat in British Columbia and the pressures from human encroachment, it is extremely unlikely that bears would move into the NCE. In addition, the decision to not actively restore bears to the NCE would, over the long term, result in the species being extirpated. Although action to maintain core habitat and survey for grizzly bears in the NCE would continue, little benefit would be provided because of the very small number of bears potentially present. Grizzly bear source populations would not be affected under alternative A because no grizzly bears would be removed. Furthermore, there would be no impacts associated with capture, release, and monitoring under alternative A because active restoration would not occur. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on grizzly bears, but the existing very low estimate of bears in the NCE and the decision under alternative A not to restore them would contribute substantially to overall adverse impacts on grizzly bears. Alternative A would not avoid the permanent loss of grizzly bears in the NCE or enhance or contribute to overall grizzly bear recovery.

Alternative B: Ecosystem Evaluation Restoration

Alternative B would release up to 10 grizzly bears over the first 2 years of initial restoration activities, monitor those bears for 2 years and then make a determination on the release of additional bears. Depending on the outcome of monitoring, managers could decide to repeat the initial release and continue monitoring or transition to alternative C. If managers decided to move toward implementation of alternative C during the adaptive management phase of this alternative, the impacts would coincide with those described for alternative C, below.

Alternative B focuses on identifying optimal release sites through monitoring to promote higher reproduction, less emigration from restoration areas, and fewer human encounters for translocated grizzly bears in subsequent releases, so it is reasonable to assume that the survival rate under this alternative would be at the higher end of the given range (2%–4%).

Capture, Release, and Monitoring. Restoration of grizzly bears into the NCE would require their capture and transport from other areas, and some level of mortality is expected among the translocated grizzly bears. However, every effort would be taken to minimize capture and transport-related mortalities. The North Cascades Grizzly Bear Recovery Team (British Columbia 2004) estimates that approximately 2% of the grizzly bear population in the NCE would be lost to human-caused mortality each year, including mortalities associated with restoration activities.

Under alternative B, there is a possibility of grizzly bear mortality during capture and release. In the Northern Continental Divide Ecosystem (NCDE), the draft 2013 NCDE Grizzly Bear Conservation Strategy reported 15 capture-related grizzly bear mortalities between 1998 and 2011, which equates to 1.1 grizzly bears per year and accounted for 5% of the total human-caused grizzly bear mortalities during that period. The Interagency Grizzly Bear Study Team for the GYE reported mortality rates of 0.7% and 0.69% for grizzly bear handling events (n = 863) and capture events (n = 1,014) between 1986 and present (van Manen pers. comm. 2016). Only one of these mortalities was confirmed as capture-related, where a snared grizzly bear was killed by another grizzly bear in 2013. Furthermore, five out of seven of the handling-related mortalities between 2006 and 2008 resulted from bacterial infections transmitted through survey instruments. No bacterial-related deaths have been reported since a new standard was implemented requiring mandatory use of antibiotics on captured animals; therefore, human-caused mortality during capture and release is expected to be minimal.

Source Population. Alternative B would remove up to 5 grizzly bears per year over an initial 2-year period from trapping efforts occurring in south-central British Columbia and/or the NCDE. Occasionally, a few grizzly bears would be needed to replace bears in the NCE that either die or emigrate from the NCE to maintain the desired population trajectory.

South-Central British Columbia—Alternative B would likely remove five or fewer grizzly bears a year from the Wells Gray region of British Columbia, including Wells Gray and Trophy Mountain Parks, over the initial two-year period. Given a grizzly bear population that was slightly over 300 bears in 2012, this would amount to approximately 1.7% of the estimated total population, well below the 6% hunter harvest rate in British Columbia considered to result in a sustainable population (Boyce, Derocher, and Garshelis 2016). Since these populations are not currently hunted, the removal of 1.7% of the population would not affect the sustainability of the local populations.

NCDE—Alternative B would likely remove five or fewer grizzly bears a year from the NCDE over the initial two-year period. Given a grizzly bear population that is likely in excess of 1,000 individuals, this would amount to approximately 0.5% of the estimated total population. Given the estimated sustainable harvest for independent female and male grizzly bears of 2.3% and 3.0% of the total population size, respectively (Costello, Mace, and Roberts 2016), and that the population is not currently hunted, the translocation of grizzly bears from the NCDE to the NCE under alternative B is not likely to affect the sustainability of the resident population of grizzly bears in the NCDE.

Cumulative Impacts

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on grizzly bears under alternative B would be the same as those described for alternative A. Alternative B would result in some limited benefit to grizzly bears by restoring a small number of them to areas of suitable habitat; however, it is unlikely that alternative B would result in meaningful population increases on its own. Overall, cumulative impacts under alternative B to grizzly bears would be beneficial, though the contribution of alternative B would be small, limited by the small number of bears released. If a decision is made to transition to alternative C, grizzly bears would experience additional benefits as the population is restored.

Conclusion

The NCDE in Montana and areas of south-central British Columbia have been identified as source areas for capture and translocation of grizzly bears into the NCE. These areas have habitat similar to the NCE and sufficient numbers of grizzly bears to be source areas without affecting the sustainability of the local populations of grizzly bears. The actual number of grizzly bears captured each year would depend on the availability of grizzly bears for translocation and substantial effort by capture crews. The slow release and monitoring of relocated grizzly bears should result in higher survival rates based on higher quality release areas when a decision is made to add additional bears to the population.

Alternative B would have no substantial adverse impacts on the health of source populations because mortality limits in the *Grizzly Bear Recovery Plan* (FWS 1993a) and British Columbia grizzly bear management criteria (BC Ministry of Environment, Lands, and Parks 1995) would be met during implementation of this alternative (less than 5%–6%). Further, because no grizzly bears would be removed from the NCDE in excess of mortality limits and no female grizzly bears would be removed from within Primary Conservation Area, the NCE grizzly bear restoration program would not prevent the NCDE from achieving its own grizzly bear recovery goals due to translocation of grizzly bears from the NCDE to the NCE.

Grizzly bears released into the NCE would benefit in the long term from a large block of suitable habitat that would help further the conservation of the species. Alternative B could promote the highest survival rate of translocated bears of all the action alternatives through its monitoring and adaptive management plan, but the slower rate of releases could likely increase the amount of time to achieve the restoration goal in the NCE. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on grizzly bears, but in aggregate, these impacts would be largely beneficial. Alternative B would result in some limited benefits to grizzly bears by initiating releases that could help begin to restore them to areas of suitable habitat. If a decision is made to transition to alternative C, grizzly bears would experience additional benefits as the population is restored.

Alternative C: Incremental Restoration

Alternative C would release 5 to 7 grizzly bears per year over 5 to 10 years to achieve an initial population of 25 grizzly bears in the NCE. Once an initial population of grizzly bears has been established in the NCE, it would take between 60 and 100 years to reach 200 bears, depending on the actual survival rate. To promote a higher reproduction rate, the sex ratio for grizzly bears released in the NCE would be slightly skewed towards female grizzly bears, and grizzly bears would be released in close proximity to one another. However, in the case that population targets are not met, the adaptive management strategy for alternative C states that additional grizzly bears could be released in the NCE to achieve restoration goals every few years.

Figures 10 illustrates the projected grizzly bear population over time, with continual release of grizzly bears until the restoration goal is reached. These projections are based on data collected from the CYE grizzly bear augmentation and subsequent monitoring and use the same assumptions regarding population growth and survival rates described above (Kasworm pers. comm. 2016b). The projections use an anticipated population growth rate between 2% and 4%, a survival rate for cubs of approximately 63%, and a survival rate for yearlings of approximately 88%. Survival rates for subadult females and males (up to age 5) were 82% and 76%, respectively, whereas survival rates for adults beyond age 5 were 95% for females and 91% for males. Approximately 72% of the founder bears released into the ecosystem are expected to remain in the ecosystem (Kasworm pers. comm. 2016b).

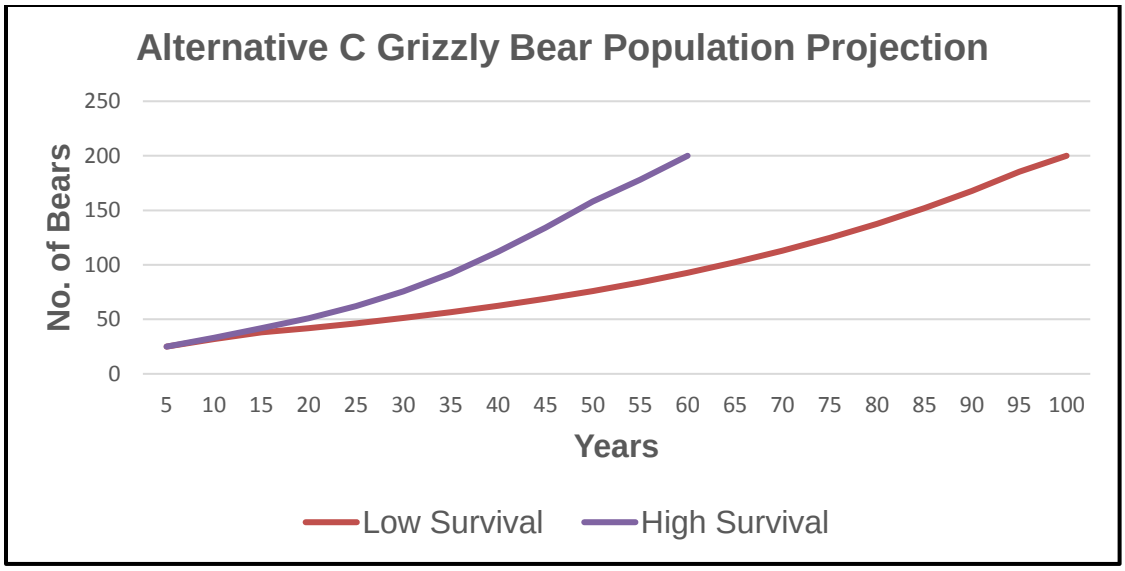

FIGURE 10. APPROXIMATE ALTERNATIVE C GRIZZLY BEAR POPULATION PROJECTION

Capture, Release, and Monitoring. Alternative C would use the same methods to capture and transport grizzly bears as alternative B; therefore, translocated grizzly bears would be exposed to the same level of risk as discussed under alternative B. Over the course of the restoration program, it estimated that 34 grizzly bears would need to be captured and released; additional capture and handling events would likely be required to achieve the target population of 200 grizzly bears. Additional bears may be required to supplement the population resulting in the need to capture, transport, and release approximately 2 bears every few years. However, capture, release, and monitoring efforts for alternative C are expected to result in minimal grizzly bear mortality—estimated at 2%–4%.

Source Population. Assuming an equal contribution of grizzly bears from Canada and the United States, alternative C would remove approximately 5 to 7 grizzly bears per year combined from south-central British Columbia and the NCDE, depending on capture success. Additional grizzly bears could be needed to replace any translocated bears that either die or emigrate from the NCE, to maintain the desired population. To achieve an initial population of 25 grizzly bears in the NCE, a total of 34 grizzly bears would be needed to account for mortality and emigration of bears from the NCE. Once the initial population of 25 grizzly bears has been achieved, the adaptive management strategy for alternative C may require additional translocation of bears to the NCE depending on a variety of factors, including human-caused mortality, genetic limitations, population trends, and adjustment of the sex ratio.

South-Central British Columbia—Alternative C would remove a maximum of 5 to 7 grizzly bears a year from the Wells Gray region of British Columbia, including Wells Gray and Trophy Mountain Parks over the initial 5- to 10-year period. Given a grizzly bear population that was slightly over 300 bears in 2012, this would amount to approximately 1.7%–2.3% of the estimated total population, well below the 6% hunter annual harvest rate in British Columbia considered to result in a sustainable population (Boyce, Derocher, and Garshelis 2016). This analysis also holds true for the capture of a couple of bears every few years as needed to help meet restoration goals. Because these populations are not currently hunted, the removal of 1.7%–2.3% of the population would not affect the sustainability of the local populations.

NCDE—Alternative C could also remove a maximum of 5 to 7 grizzly bears a year from the NCDE over the 5 to 10 years necessary to achieve an initial population of 25 bears. Given a NCDE grizzly bear population that is likely in excess of 1,000 individuals, this would amount to approximately 0.5%–0.7% of the population per year. This analysis also holds true for the capture of a couple of bears every few

years as needed to help meet restoration goals. Given the estimated annual sustainable harvest for independent female and male grizzly bears of 2.3% and 3.0% of the total population size, respectively (Costello, Mace, and Roberts 2016), and that this population is not currently hunted, the translocation of grizzly bears from the NCDE to the NCE under alternative C is not likely to affect the sustainability of the resident population of grizzly bears.

Cumulative Impacts

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on grizzly bears under alternative C would be the same as those described for alternative A. Overall, ongoing and reasonably foreseeable future actions would have both beneficial and adverse impacts on grizzly bears, but in aggregate, these impacts would be largely beneficial given the amount of secure grizzly bear habitat available. Alternative C would result in lasting benefits to grizzly bears by helping to restore them to areas of suitable habitat. Overall, long-term cumulative impacts on grizzly bears would be beneficial, and the contribution of alternative C would be substantial.

Conclusion

The NCDE in Montana and south-central British Columbia have been identified as source areas for translocation of grizzly bears into the NCE. These areas have habitat similar to the NCE and have sufficient numbers of grizzly bears to be source populations. The actual number of grizzly bears captured each year would depend on the availability of grizzly bears for translocation and substantial effort by capture crews.

Alternative C would have no substantial adverse impacts on the health of source populations because mortality limits in the *Grizzly Bear Recovery Plan* (FWS 1993a) and British Columbia grizzly bear management criteria (BC Ministry of Environment, Lands, and Parks 1995) would be met during implementation of this alternative. Further, because no grizzly bears would be removed from the NCDE in excess of mortality limits, and no female grizzly bears would be removed from within the Primary Conservation Area, the NCE grizzly bear restoration program would not prevent the NCDE from achieving its own grizzly bear recovery goals due to translocation of grizzly bears from the NCDE to the NCE.

Grizzly bears released into the NCE would benefit in the long term from a large block of suitable habitat that would help further the conservation of the species. Alternative C would achieve an initial population of 25 grizzly bears in the NCE with an expectation of achieving the restoration goal of 200 bears in 60 to 100 years. Ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on grizzly bears, but alternative C would result in lasting benefits to grizzly bears by restoring them to areas of suitable habitat. Overall, alternative C would prevent the permanent loss of grizzly bears from the NCE while enhancing their long-term survival and contributing to species recovery.

Alternative D: Expedited Restoration

Alternative D would release 5 to 7 grizzly bears per year into the NCE until a population of approximately 200 grizzly bears in the NCE is achieved. Using an estimated natural population growth rate of 2%–4% per year for translocated grizzly bears, based on a FWS estimate of the growth rate of grizzly bear populations in the CYE, it would take approximately 25 years to reach 200 bears in the NCE using the expedited restoration strategy and assuming a certain amount of reproduction. While alternative D would achieve the restoration goal of 200 bears at a faster rate (fewer number of years), it would likely result in a lower natural population growth rate relative to the other action alternatives because the sex and age class of translocated bears would be less restrictive under alternative D because of the need to

capture grizzly bears every year until the restoration goal is achieved. A lower natural population growth rate would increase the number of translocated grizzly bears required to achieve the restoration goals relative to the other action alternatives.

Figures 11 illustrates the projected grizzly bear population over time based on continual release of grizzly bears until the restoration goal is reached. These projections are based on data collected from the CYE grizzly bear augmentation and subsequent monitoring and use the same assumptions regarding population growth and survival rates described above and under alternative C (Kasworm pers. comm. 2016b).

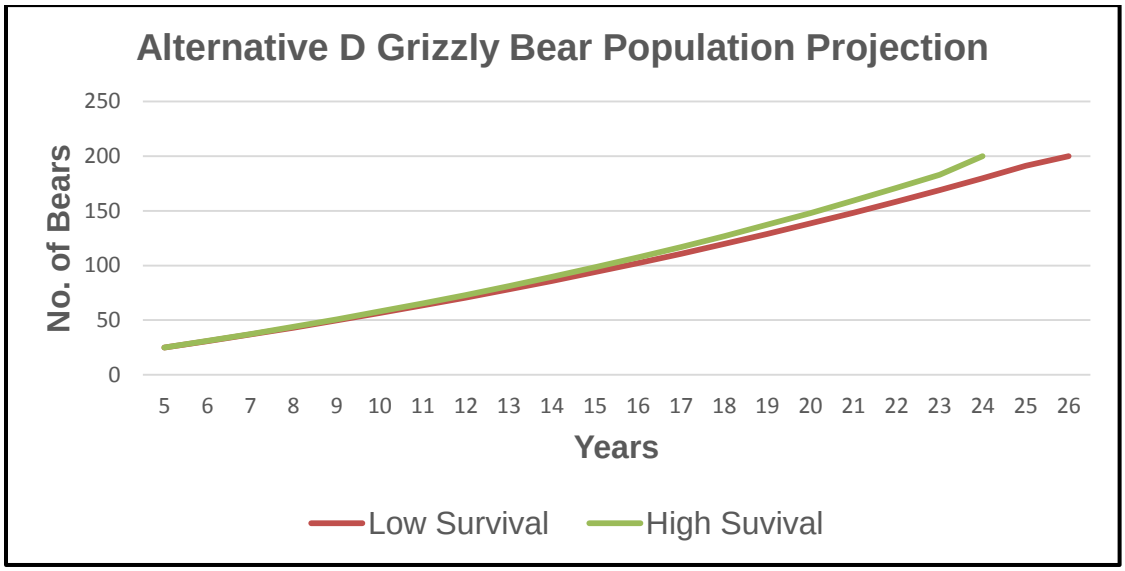

FIGURE 11. APPROXIMATE ALTERNATIVE D GRIZZLY BEAR POPULATION PROJECTIONS

Capture, Release, and Monitoring. Alternative D would use the same methods to capture and transport grizzly bears as described under alternatives B and C; therefore, translocated grizzly bears would be exposed to the same level of risk as discussed in alternative B. However, alternative D would require the translocation of 155 to 168 grizzly bears, assuming a ratio of 119–129 females to 36–39 males can be obtained, which is approximately 5 times the number of grizzly bears required for alternative C. In addition, the greater level of trapping effort required by alternative D would increase the volume of traps and snares set by management agencies in source population areas, thereby increasing the risk of capture-related mortality. As a result, alternative D would have a much higher risk of capture-and-release-related mortality relative to the other two action alternatives.

Source Population. Alternative D would rely on contributions of grizzly bears from south-central British Columbia and the NCDE as they become available. Approximately 5 to 7 bears would be sourced from these populations per year for approximately 25 years. As described above for alternative C, this level of removal would be well below established annual sustainable harvest rates for each of the source population areas. However, alternative D would require a more sustained effort because grizzly bears would be needed each year for up to 25 years, which would require managers to carefully design capture operations to distribute pressure across the local populations to avoid potential effects of over-trapping certain areas. Overall, translocation of grizzly bears from British Columbia or the NCDE to the NCE is not likely to have any substantial adverse impacts on the resident population of grizzly bears in the source areas.

Cumulative Impacts

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on grizzly bears under alternative D would be the same as those described for alternative A. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on grizzly bears given the amount of secure habitat available to grizzly bears. Alternative D would result in lasting benefits to grizzly bears by restoring them to areas of suitable habitat. Overall, long-term cumulative impacts on grizzly bears would be beneficial, and the contribution of alternative D would be substantial.

Conclusion

The NCDE in Montana and south-central British Columbia have been identified as source areas for translocation of grizzly bears into the NCE. These areas have habitat similar to the NCE and have sufficient numbers of grizzly bears to be source populations. However, the rapid rate (restoration over 25 years) of grizzly bear translocation under alternative D means that grizzly bears captured from source populations may not always be of the desired sex and age range, and the actual number of grizzly bears captured would depend on the availability of grizzly bears for translocation and substantial effort by capture crews. As a result, alternative D is likely to have the highest grizzly bear mortality or emigration rates of any of the action alternatives.

While alternative D would require the greatest number of translocated grizzly bears of any of the action alternatives by far, it would have no substantial adverse impacts on the health of source populations because mortality limits in the *Grizzly Bear Recovery Plan* (FWS 1993a) and British Columbia grizzly bear management criteria (BC Ministry of Environment, Lands, and Parks 1995) would be met. Further, because no grizzly bears would be removed from the NCDE in excess of mortality limits, and no female grizzly bears would be removed from within the Primary Conservation Area boundary, the NCE grizzly bear restoration program would not prevent the NCDE from achieving its own grizzly bear recovery goals due to translocation of grizzly bears from the NCDE to the NCE.

Grizzly bears released into the NCE would benefit in the long term from a large block of suitable habitat that would help further the conservation of the species. Alternative D would achieve the restoration goal of 200 grizzly bears in the NCE 3 to 5 times faster than alternative C, but the rapid restoration rate would require the translocation of approximately 5 times the number of grizzly bears. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on grizzly bears, but alternative D would result in short- and long-term benefits to grizzly bears by restoring them to areas of suitable habitat. Similar to alternative C, except at a faster rate, alternative D would prevent the permanent loss of grizzly bears from the NCE while enhancing their long-term survival and contributing to species recovery.

Areas outside the NCE

Although grizzly bears would be released into remote wilderness areas of the NCE, they could move outside of the NCE into adjacent parts of Washington. Bears that move into suitable grizzly bear habitat could be left there if they did not pose a risk of coming into conflict with humans and livestock. Data from released bears in the Cabinet Mountain from 1990 through 2015 indicate that bears moved, on average, up to approximately 9 miles from the release sites. In the first month bears moved up to approximately 7.5 miles away from release sites; within the first year, they moved approximately 9.5 miles (Kasworm pers. comm. 2016b). If these same patterns were reflected in the NCE, it is unlikely that bears would leave the NCE for other areas of Washington in the near term because the closest release site is approximately 14 miles from the boundary of the NCE, with most sites more than 20 miles away. As

the population grows, bears could increase movements; however, it is unlikely that a meaningful proportion of the released population would leave the NCE.

Bears that move outside of what is considered suitable habitat would be recaptured and moved back to the NCE if at all possible. Based on existing 4(d) rules, managers and landowners could take actions to mitigate human-grizzly bear conflicts, including using hazing and killing bears. These types of actions could reduce the bear population; however, the expected likelihood of these impacts is low based on the low likelihood of bears moving out of the NCE. Any mortality associated with bears moving outside the NCE is expected to be within the 2%–4% estimate previously described.

In the event that the option to designate the NCE population of grizzly bears as a section 10(j) experimental population is implemented, additional management measures may become available to managers to use non-lethal measures to reduce impacts on grizzly bears that move outside NCE or to mitigate human-grizzly bear conflicts.

OTHER WILDLIFE AND FISH

This section assesses the impacts on other wildlife and fish, including mammals, birds, and fish. Impacts on mammals are analyzed in terms of disturbance from restoration activities as well as predator-prey interactions and interspecific competition.

Methods and Assumptions

Potential impacts on other wildlife and fish were evaluated qualitatively based on resource expert knowledge and professional judgment, review of scientific literature, anticipated rates and locations for release of grizzly bears, and the resource-specific issues identified in chapter 1.

Issues Analyzed. The analysis of impacts on other wildlife and fish under each alternative is based on the following issue statements that are identified in chapter 1:

> **Issue Statement.** Wildlife species could be affected by noise and human-related disturbance associated with the capture and release of grizzly bears. Therefore, this impact topic was retained for analysis.
>
> **Issue Statement**. Wildlife or fish species such as elk and deer, black bear, and trout could be affected in terms of grizzly bear predation or competition for resources. Therefore, this impact topic was retained for analysis.

Assumptions

A number of assumptions were made to analyze the impacts on other wildlife and fish, including several assumptions related to helicopter and other noise disturbance. Wildlife response to aircraft can be highly variable depending on species, type of study, ecological characteristics, and other attributes (NPS 1994). NPS (1994) and other studies (Stockwell, Bateman, and Berger 1991; Manci et al. 1988) generally conclude that helicopter flights below 500 feet above ground level stimulate a stronger response than fixed-winged aircraft or higher altitude flights.

A study near Fort Sill, Oklahoma suggests that reaction to noise could be related to the experiences of the individuals and groups affected—e.g., bison “appeared oblivious” to F-105 overflights in the early 1970s (Frazier 1972 as cited in Manci et al. 1988). Other studies indicate environmental conditions, age class, gender, season, type and elevation of aircraft, and even the activity the wildlife is participating in prior to

the disturbance all may influence the reaction (NPS 1994; Ellis, Ellis, and Mindell 1991). Furthermore, several studies (NPS 1994; Carrier and Melquist 1976; Kushlan 1979) conclude that minimal use of aircraft, such as limited-season aerial surveys, are not likely to cause harm or have long-term effects on mammal or bird species; however, no long-term studies have been conducted to confirm this conclusion.

A Hughes 500 or similar helicopter would be required during the capture and release of grizzly bears for any of the possible action alternatives. Federal Aviation Administration testing data (FAA 1977) determined that a Hughes 500 produces between 71 and 90 dBA (A-weighted decibel) during hovering, approach, and low speed (airspeed of 69 miles per hour [mph] at 500 feet above ground level) flyover maneuvers (FAA 1976). Additionally, medium duty diesel trucks may be needed to move culvert traps, grizzly bears, and other equipment. Passing diesel trucks have been recorded producing upwards of 85 dBA (Purdue University 2015) at speeds of 40 mph.

Ambient noise levels can vary depending on location and conditions (Falzarano 2005). Rural settings have been reported to have an ambient noise level of 30 dBA; quiet urban settings have an ambient noise level of 40 dBA; and some bird calls have been recorded at 44 dBA (Purdue University 2015). Falzarano (2005) suggests that backcountry and wilderness areas may be even quieter at 15 dBA to 30 dBA with much louder noise associated with occasional events (e.g., lightning cracks and overflights). Ambient noise levels at grizzly bear capture and release locations in wilderness settings were assumed, under normal conditions, to likely range from 30 dBA to 45 dBA; therefore, the noise associated with a Hughes 500 is expected to be at least eight times louder than normal ambient conditions. However, as suggested in various studies (NPS 1994; Manci et al. 1988; Ellis, Ellis, and Mindell 1991; Stockwell, Bateman, and Berger 1991), no known direct correlation exists between a specific sound level and responses by wildlife or birds.

In addition to emitting noise, helicopters would also produce what is termed "downwash." Downwash is defined as the air that is directed vertically down from the horizontal main rotor. Helicopter downwash is calculated by (Rotor&Wing International 2011):

$$\sqrt{\left(\left(\frac{gross\ wt}{2}\right) \times (air\ density) \times (rotor\ disk\ area)\right)}$$

Based on the calculation, a Hughes 500 at sea level would produce a downwash of approximately 23 mph at the base of the main horizontal rotor. However, as the air is forced downward, the air column is restricted (due to outflow and recirculation of air) and because of the Venturi effect, downwash reaches maximum velocity at a distance of approximately twice the rotor diameter below the rotor (Rotor&Wing International 2011). Again, assuming use of a Hughes 500 at sea level, maximum downwash velocity is expected at 53 feet below the rotor at a speed of 46 mph. Assuming grizzly bear capture and release sites are at an approximate elevation of 5,000 feet above mean sea level and a combined culvert trap and grizzly bear weight of 850 pounds, maximum downwash from a Hughes 500 during grizzly bear transport would be 63 mph at 53 feet below the rotor. Downwash could affect birds nesting or flying below the helicopter. However, helicopters would be flying approximately 100 feet above tree level.

Additional alternative-specific assumptions are described under each alternative.

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

Other Wildlife

Under alternative A, the USFS would continue to uphold the 1997 access management agreement, wherein no net loss of core area would occur, and the NPS would follow the direction provided in the Ross Lake GMP (see chapter 2). The no-action alternative would result in no active transport or release of grizzly bears into the NCE. Because alternative A would not require any change to management practices or other NPS or USFS activities, no new impacts on other wildlife species in the NCE would occur.

Predator-Prey Interactions. As described in chapter 3, grizzly bears are omnivores, but primarily feed on vegetation. Studies indicate that a grizzly bear diet consists of about 90% vegetable and insect matter; however, they also scavenge and prey on ungulates and ground-dwelling rodents. In many locations, animal matter may not constitute a major annual diet item but may be seasonally vital to grizzly bears (Mattson, Blanchard, and Knight 1991; Gunther and Haroldson 1998).

Because alternative A would not release any bears into the NCE, no predator-prey interactions related to released grizzly bears would occur. If grizzly bears are present in the NCE, some small level of predation would continue; however, with an estimated six or fewer bears, any associated predation would be discountable and not result in a population-level response.

Interspecific Competition. As described in chapter 3, grizzly bears in the NCE could compete with gray wolves, coyotes, fishers, Canada lynx, cougars, bobcats, and black bears. Because alternative A would not actively restore grizzly bears, no interspecific competition would occur between released bears and other species. In addition, although some very low level of competition could occur with these species from grizzly bears currently in the NCE, any impacts would be restricted to individual animals and would not likely affect local species populations in a meaningful way because any impacts would be discountable and would not change from current conditions.

Grizzly and black bear population relationships have been studied in areas similar to the NCE as described in chapter 3. Grizzly bear interactions with black bears could result in black bear predation or partitioning of resources. However, because alternative A would not restore grizzly bears to the NCE, no impacts on black bear populations from released bears would occur. Any existing level of black bear predation by grizzly bears would not have a meaningful effect on local black bear populations because any impacts would be discountable and would not change from current conditions.

Birds

Because alternative A would not actively restore grizzly bears, bird species in the NCE would not be affected. Any grizzly bears currently in the NCE would not have a meaningful effect on local bird populations because any impacts would be discountable and would not change from current conditions.

Fish

Because no active grizzly bear restoration activities would take place under the no-action alternative, fish species in the NCE would not be affected. Any grizzly bears present in the NCE could prey on fish; however, given the low estimate of bears (approximately six or fewer), the impacts on any given fish population would be discountable and would not change from current conditions.

Cumulative Effects

Present and ongoing NPS actions with the potential to result in cumulative impacts on other wildlife include ongoing wildlife monitoring efforts, fisher restoration, ongoing trail maintenance and repairs, invasive plant management within wilderness, mountain lakes restoration, fire management operations, the *Stehekin River Corridor Implementation Plan*, the *North Cascades National Park Service Complex Fish Stocking Act* (2014), and administrative flights for search and rescue operations and other purposes. Present and ongoing USFS actions with the potential to result in cumulative impacts on other wildlife species include forest vegetation management, cattle and sheep grazing, motorized travel management projects, mining, CERCLA mine cleanup and abandoned mine lands projects, ski area expansion projects, forest plan updates, ongoing trail maintenance, ongoing road maintenance, wildfire suppression, invasive plant management, special-use permit issuance, and river and aquatic restoration projects. Other projects with the potential to affect other wildlife include the Interstate 90 expansion and recreational and tribal hunting.

Ongoing NPS wildlife monitoring efforts would have little impact on other wildlife species because most monitoring is non-intrusive, and most impacts would occur as a result of human presence engaged in the monitoring activity. Fisher restoration by the NPS would have beneficial impacts on other wildlife because it would restore a population of a state endangered species to the NCE. Invasive plant management within NPS wilderness would have beneficial impacts on other wildlife through the enhancement of native habitat. NPS mountain lakes restoration would have beneficial effects for native aquatic fauna because it would remove non-native fish, although in certain lakes, fish stocking would have adverse impacts because it could affect native aquatic fauna by introducing non-native fish. NPS fire management operations would have beneficial impacts on other wildlife because they would provide opportunities for habitat enhancement. The *Stehekin River Corridor Implementation Plan* could have adverse impacts because it could reroute roads and affect native habitat and displace wildlife. Administrative flights for NPS search and rescue operations, transporting materials for trail maintenance, and transporting staff could have adverse impacts on some wildlife species as a result of disturbance from helicopter and aircraft noise, especially if these flights occur during nesting, denning, or rearing periods.

USFS forest vegetation management projects could have both beneficial and adverse impacts on other wildlife depending on whether they create opportunities to enhance habitat for certain species. Cattle and sheep grazing on USFS lands could have adverse impacts on wildlife or fish species if grazing in riparian areas creates stream turbidity or results in habitat degradation or competition for resources. USFS motorized travel management projects and ongoing road and trail maintenance could have beneficial impacts on fish species through the reduction or mitigation of runoff into streams; adverse impacts on some sensitive species could occur if these species tend to avoid roads and trails or if road or trail construction displace habitat for these species. Beneficial impacts could occur from the decommissioning of roads in or near species habitat. CERCLA mine cleanup and abandoned mine lands projects on USFS lands would have beneficial and adverse effects on fish by preventing toxic runoff into streams. Ski area expansion projects on USFS lands could have adverse impacts on some wildlife and fish species because ground-disturbing activities could increase runoff into streams, and land clearing efforts could disturb habitat for some terrestrial or avian species. USFS wildfire suppression efforts could have both beneficial and adverse impacts on fish and wildlife because it would help reduce the risk of catastrophic fires and improve understory habitat. USFS river and aquatic restoration projects would have beneficial impacts on fish species because they would enhance fish habitat. The expansion of Interstate 90 could have beneficial impacts on certain species through the creation of wildlife underpasses that increase opportunities for dispersal. Recreational and tribal hunting and fishing would continue to affect other wildlife and fish through associated mortality; however, wildlife managers ensure sustainable populations by establishing harvest limits.

Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on other wildlife and fish species, but in aggregate, these impacts would be beneficial given the large amount of protected habitat in the NCE. The decision to not actively restore grizzly bears under alternative A would result in no impacts on other wildlife and fish. Over the long term as grizzly bear numbers continue to decline, any associated predation or competition would also decrease. Overall, cumulative impacts on other wildlife and fish under alternative A would be beneficial, with the contribution of alternative A being discountable.

Conclusion

Under the no-action alternative, no active grizzly bear restoration actions would be undertaken. As a result, no impacts on other wildlife or fish are expected from released bears. Some very low, ongoing impacts related to predation and competition associated with the few grizzly bears that may still be in the NCE is expected, but any impacts would be discountable to the species affected. Ongoing and reasonably foreseeable future actions would have both adverse and beneficial impacts on other wildlife and fish, although given the large area of intact habitat in the NCE, impacts would be overall beneficial. However, any contribution from alternative A would be discountable.

Alternative B: Ecosystem Evaluation Restoration

Alternative B would release up to 10 grizzly bears over the first 2 years of initial restoration activities, monitor those bears for 2 years, and then make a determination on the release of additional bears. Depending on the outcome of monitoring, managers could decide to repeat the initial release and continue monitoring or transition to alternative C. If managers decide to move toward implementation of alternative C during the adaptive management phase of this alternative, the impacts would coincide with those described for alternative C below.

Predator-Prey Interactions. Following completion of the primary restoration phase under alternative B, there would be an initial population of 10 grizzly bears in the NCE with a target sex ratio of 60% females to 40% males.

Studies in the GYE indicate that some grizzly bears are active predators on elk calves given the high calf abundance. Researchers made 944 sightings of grizzly bears on elk calving grounds over 5 years and documented 70 hunts for elk calves, of which 26 were successful (Gunther and Renkin 1990). These researchers noted that the percentage of successful hunts declined dramatically during July as calves became more mobile. Mattson (1997) found that grizzly bears preferred small prey in the form of elk and moose calves and only occasionally preyed on adults. French and French (1990) found that while some grizzly bears were active predators, they were not always very successful, and many grizzly bears never even attempted to prey on ungulate calves. Ungulates are most often incorporated into the grizzly bear diet when they are the most available and vulnerable (e.g., calves during the calving season, winter-killed or weakened animals during spring) (Green and Mattson 1988), and weakened males during the fall rut (Schleyer 1983). Ultimately, Mattson (1997) concludes that grizzly bear predation rates average between 1.4 and 5.8 ungulates per year for adult female and male bears, respectively.

Based on grizzly bear predation rates reported by Mattson (1997) from the GYE, an initial population of 10 adult grizzly bears would on average kill between approximately 14 and 58 ungulates a year depending on the sex ratio. Although no total ungulate population estimate for the NCE is available, based on the conservative population numbers identified in chapter 3, if the NCE contained roughly 70,000 elk, deer, and other ungulates the depredation from up to 10 grizzly bears would be between approximately 0.02% and 0.08 % of the ungulate population.

As described in chapter 3, grizzly bear predation is variable, with male adult grizzly bears in the GYE representing some of the highest rates, in part because of the high population density of ungulates there (Jacoby et al. 1999). Because grizzly bears restored to the NCE would be from areas with similar food economies, their consumption of ungulates is anticipated to be much lower, as discussed in chapter 3. Therefore impacts in the NCE would likely be lower than those described above. Grizzly bears released into the NCE are expected to have an opportunistic feeding strategy and would not single out specific species to prey on. Therefore, grizzly bears are not expected to have any substantial adverse impacts on ungulate or other prey populations in the NCE under alternative B. If a decision is made to transition to alternative C, additional impacts could occur, as described for alternative C below.

Interspecific Competition. As described in chapter 3, some species of predator in the NCE may compete with grizzly bears for prey or other resources. The species most likely to compete or interact with released grizzly bears include gray wolf, coyote, fisher, Canada lynx, cougar, bobcat, and black bear. If a decision is made to transition to alternative C, additional impacts could occur as described for alternative C below.

Gray Wolf. Competition between grizzly bears and gray wolves would be unlikely under alternative B. Most interactions between grizzly bears and wolves that have been documented in other ecosystems are usually characterized by mutual avoidance (Servheen and Knight 1990; Gunther and Smith 2004). Additionally, the two species largely use different food sources. Wolves tend to prey on ungulates year-round, while grizzly bears feed on ungulates primarily as winter-killed carcasses and ungulate calves in spring, and weakened or injured male ungulates during the fall rut (Mattson, Blanchard, and Knight 1991; Fortin et al. 2013). In the NCE, grasses, sedges, forbs, berries, nuts, and roots are expected to comprise the major portion of grizzly bear diets throughout the year. As a result, no consequential, adverse impacts on gray wolves is expected as a result of grizzly bear restoration under alternative B.

Coyote. Because of the coyote's opportunistic feeding strategy and abundance and because of the small number of bears released, grizzly bears would not likely place any competitive pressure on coyote populations in the NCE under alternative B.

Fisher. The potential for adverse impacts on fisher from competition with and predation by grizzly bears would be very low if at all given the small number of bears released and the different habitats exploited by fisher. In addition, the presence of grizzly bears is not expected to affect fisher restoration. As a result, grizzly bears would not likely place any competitive pressure on fisher populations in the NCE under alternative B.

Canada Lynx. Given the low numbers of lynx in the NCE and the small number of grizzly bears released under alternative B, the chance of overlapping with active lynx areas would be small. In the event that there are lynx at the single release site, the likelihood that grizzly bears would compete for food resources would be low because lynx rely heavily on snowshoe hare for food. As a result, grizzly bears would not likely place any competitive pressure on lynx populations in the NCE under alternative B.

Cougar. Although some dietary overlap may exist between cougars and grizzly bears, cougars typically do not occupy the same habitat as grizzly bears. In addition, the small number of grizzly bears released under alternative B would not consume enough meat to place any competitive pressure on cougar populations in the NCE.

Bobcat. Bobcats may occasionally use open habitat and meadows that are preferred by grizzly bears, but bobcats tend to prefer steep, rocky terrain for shelter, raising young, and resting. In addition, the generalist diet of bobcats and grizzly bears would not likely result in any competitive pressure between the two species, especially given the small number of grizzly bears released under alternative B.

Black Bears. Although some displacement occurs where grizzly and black bears coexist, potential adverse impacts on black bear population dynamics following restoration of a grizzly bear population are unclear. Grizzly and black bear population relationships have been studied in areas similar to the NCE. Black bears are the most physiologically similar to grizzly bears of the abovementioned species, and, as a result, they are expected to have the highest degree of niche overlap with grizzly bears. However, Holm, Lindzey, and Moody (1998) argued that behavioral and physiological differences have allowed the two to coexist in areas of sympatry. Apps, McLellan, and Woods (2006) studied the spatial partitioning of resources between black bears and grizzly bears and reported that these two species frequently occupy and forage in separate areas, thus avoiding conflict and maximizing foraging effectiveness. Researchers in Wyoming reported that where grizzly and black bears coexist, black bears become diurnal and occupy more forested habitat than grizzly bears, while adult male grizzly bears were nocturnal and occupied open habitat, and females and subadult grizzly bears were crepuscular, avoiding male grizzly bears (Holm, Lindzey, and Moody 1998; Schwartz et al. 2010). Areas in Glacier Park have extremely high densities of both grizzly and black bears, and Jonkel (1984) observed grizzly bears displacing black bears during drought conditions in two river bottoms typically frequented by black bears. Mattson, Knight, and Blanchard (1992) documented one instance of an adult male grizzly bear preying on a black bear in the GYE, but they reported that less than 0.15% of the 6,979 grizzly bear scats examined contained remains of black bears.

Under alternative B, adverse impacts on black bears, if any, would largely be expected to be limited to interactions between individual grizzly bears and black bears and are not expected to affect black bears at a population level.

Helicopter and Other Human Disturbances. Alternative B would require approximately 40 helicopter flights over the first 2 years of restoration activities, although some additional flights may be necessary for collar retrieval and incidental actions. The noise produced by vehicles, associated human activities, and other disturbances needed to complete the capture and release process would result in adverse impacts on wildlife through temporary disturbances and avoidance of active staging and release areas. Impacts would be limited in duration to 5 to 7 days per year during the mid- to late summer and fall and would be localized to capture and release sites and helicopter flight paths.

The presence and noise associated with aircraft in the NCE is not uncommon. Between 2011 and 2014, the park complex averaged approximately 142 flight hours over wilderness per year (Braaten pers. comm. 2016); the majority of flight hours are typically associated with fire management operations. The flights are often staged outside of wilderness (NPS 2014). A large percentage of the flights are made with smaller, lightweight helicopters such as a McDonald Douglas MD500D or 530F.

Mammals—Introduction of helicopters, trucks, and other capture/transport/release equipment into an area with few human disturbances could have an effect on certain species of mammals, especially those in close proximity to staging and release activities (e.g., ungulates, ground squirrels). Alternative B would result in impacts from noise and disturbances that would likely disperse individuals to areas outside of grizzly bear capture, staging, and release sites, although the flight distance would likely be species-specific. Stankowich (2008) suggests ungulates associate different levels of danger with different types of disturbances as he documented differing responses by elk to humans on foot versus humans in vehicles. This would suggest that even limited use of a truck to transport culvert traps has the potential to affect species during capture and release activities. Stankowich (2008) also identified that in some circumstances, mule deer were likely to respond more intensely to humans in an "off-trail" situation than humans in an "on-trail" setting. The simple presence of personnel, even without use of motorized transportation, can trigger a response. Possible wildlife responses to noise and visual cues of people, helicopters, trucks, and other associated equipment can range from an alert posturing to a very energetic escape response, possibly resulting in separation of young from mothers or injuries (NPS 1994;

Stankowich 2008). The displacement of individuals may result in additional stress on these individuals; however, it is unlikely to cause a substantial increase in mortality or lowering of species health.

Stankowich (2008) suggests the possibility that if an ungulate has never been exposed to humans, it may perceive people more as a "curiosity" than a threat. In these cases, wilderness area wildlife that may have never seen a person, truck, or helicopter may not recognize these disturbances as a danger and not respond at all. A complete lack of exposure to human disturbances can create situations where some species simply do not identify the disturbance as a threat that would normally trigger a flight response or other behavioral or physiological reaction.

Research has demonstrated varying short-term reactions of mammals to noise; however, overall, impacts because of helicopter and other human-made noise and disturbance would be limited, lasting for portions of a few days each year, and localized to capture and release sites and helicopter flight paths. Impacts on specific individuals would be limited to minutes and hours of operation and presence of staff and vehicles. Impacts of helicopters and human activity would likely have no population level effects, nor would these disturbances be expected to interfere with long-term behavioral or physiological processes of individuals or populations.

Birds—Impacts on birds can be examined at three separate levels: grassland birds within helicopter landing sites, edge species that may be present near landing and staging sites, and deep forest species that may be flown over during transport of grizzly bears. The NPS (1994) identified one clear connection between wildlife and aircraft, "the closer the aircraft, the greater the probability that an animal will respond, and the greater the responses." This would suggest that within helicopter landing sites, presumably grassy meadows, grassland bird species would likely incur a higher level of impact compared to birds occupying edge or deep forest habitats. Grassland birds would be exposed to noise from helicopters, the landing of the helicopter, placement of the transport culvert traps for grizzly bears, disturbances associated with release equipment and staff, and the disturbance of helicopter downwash. Noise and downwash from the helicopters may flush adult birds that may be injured or killed as a result of bird strikes with the helicopter. Furthermore, when adults are flushed, they may accidentally expel eggs or young birds from a nest, or eggs or young left in the nest may be vulnerable to predation or the effects of the downwash (NPS 1994). The downwash from the helicopter could produce enough force to destroy nests or blow young birds and eggs out of nests causing reproductive loss. All of these impacts may result in a lower recruitment rates for affected species, and if affected sites are reused for multiple years of the project, habitat abandonment may result for some species (Belanger and Bedard 1989a, 1989b, as cited in NPS 1994). Habitat abandonment has been attributed to aircraft overflights in waterfowl and water birds (NPS 1994; FWS 1993b); however, the literature is lacking as to a possible relationship between grassland bird species nest abandonment and aircraft related disturbances. Impacts on ground-nesting birds would be minimized through pre-release site assessments, and areas with active nesting would be avoided.

Birds that use edge habitat may also be influenced by the noise from helicopters and the disturbance of helicopter downwash. As helicopters land and depart from landing sites, the noise and downwash may flush birds that occupy habitats adjacent to those landing sites. Flushed adult birds may accidentally expel eggs or young birds from a nest. Waterfowl and sand hill cranes were documented to be displaced for days after low altitude aircraft disturbances (NPS 1994; FWS 1993b). However, the literature is again lacking as to a possible relationship between long periods of upland bird displacement and aircraft related disturbances.

The mostly likely response of adult birds in edge habitat would be flushing. Flushed birds run the risk of injury or death from strikes with the helicopter, and eggs or young that may be left at nest after adult birds are flushed would be vulnerable to predation and exposure. The level of risk to eggs and young birds

would depend on the duration adults remain away from the nest, abundance and type of predators present nearby, and the integrity and durability of the nest and trees where nests are located. Birds in edge areas associated with staging areas are less likely to be affected because the staging areas are commonly used for helicopter operations, and species present in those areas would be somewhat habituated to the disturbance.

Birds occupying contiguous forest stands or deep forest may be influenced by the noise associated with helicopter overflights. While transporting grizzly bears, staff, and equipment, helicopters would be flying at least 500 feet above ground level. Maximum downwash from a Hughes 500 is approximately 63 mph at 53 feet below the rotor, assuming an altitude of approximately 5,000 feet above sea level. It is presumed that at an altitude of 500 feet above the ground, downwash would not be an influencing factor to trees or birds. Noise and activities at landing sites are not likely to affect birds occupying forest stands within the NCE. Dense forest and topography are expected to shield or deflect noise produced at helicopter landing areas in both capture and release sites. The agencies therefore assumed that forest bird species would be affected only by noise associated with the overflights. Noise from the Hughes 500 may produce responses ranging from no reaction, to birds stopping calling or defending territories, possibly followed by "raucous discordant cries," to flushing birds from nests and perches (NPS 1994; Manci et al. 1988). Birds that flush from nests may expel eggs or young from nests, potentially reducing recruitment or survival of young. Additionally, a flushed bird may stay away from a nest long enough to allow a predator access to eggs or young that remain in the nest.

Raptor responses to disturbances can vary depending on the given circumstances (NPS 1994). For example, the NPS documented a bald eagle pair completely abandoning nesting activities after repeated overflights by military helicopters at Cross Creek National Wildlife Refuge in Georgia (NPS 1994). Grubb et al. (2010) found that incubating golden eagles in the Wasatch Mountain of Utah did not flush when exposed to military helicopters but did respond after hatching young. Helicopters would remain approximately 1,000 feet from any known bald eagle nests.

Possible bird responses to noise and visual cues of people, helicopters, trucks, and other associated equipment could include an alert posturing by birds, stopping calling and defending of territories, random outcries, calmly fleeing the area, energetic escape responses possibly resulting in accidentally expelling eggs and young from nest, and possible permanent nest or habitat avoidance (NPS 1994; FWS 1993b; Manci et al. 1988; Gladwin, Asherin, and Manci 1987). The displacement of individuals may result in additional stress on these individuals; however, it is unlikely to cause a substantial long-term increase in mortality or lowering of species health. Overall, impacts on birds from helicopter and other human noise would generally be short term and localized to capture, staging, and release sites and helicopter flight paths, although a few individuals (eggs and young) may be permanently lost. Unlike mammal impacts, helicopter flights have a potential to directly affect birds through bird strikes or destruction of nests, although the probability is low.

Fish

Under alternative B, initial restoration activities would not disturb fish habitat. The number of grizzly bears in the ecosystem would be very small (approximately 10), and the population is expected to remain confined to the northern portion of the NCE. Fish are not expected to be a primary food source, and the number of grizzly bears in the ecosystem would not be sufficient to generate any adverse impacts on fish populations as a result of predation.

Cumulative Effects

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on grizzly bears under alternative B are the same as those described for alternative A.

Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on other wildlife and fish species, but in aggregate, these impacts would be beneficial based on the largely intact available habitat. Alternative B would contribute short-term, adverse impacts primarily related to helicopter use limited to 40 flights over 2 years for releases and limited seasonal fixed-wing monitoring flights, but would have no long-term, adverse impacts. Overall, cumulative impacts on other wildlife and fish under alternative B would be beneficial.

Conclusion

Under alternative B, the potential exists for short-term, adverse impacts on other wildlife and fish but would be limited to the period of active restoration. The initial release of up to 10 grizzly bears into the NCE could result in disturbance to denning mammals or nesting birds as a result of disturbance from helicopter operations in close proximity to active dens or nests. The number of helicopter operations in a given season is expected to be limited to approximately 4 flights per bear (a total of 40 flights), and would be limited to 5 to 7 days per year in mid- to late summer and fall. In the long term, the potential for grizzly bear predation on and/or competition with some wildlife and fish species would be limited. However, given the habitat use, life histories, and other characteristics of many of these species, in combination with grizzly bear life history, habitat use, feeding behavior, and the expected population size and density of grizzly bears that would be present in the NCE, adverse impacts on other wildlife and fish species are not expected to affect species populations and would be largely discountable. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse effects on other wildlife species, but in aggregate, these impacts would be beneficial. Alternative B would contribute limited, adverse impacts primarily related to helicopter use during the primary restoration phase because of species disturbance, but adverse impacts are not expected following initial restoration. Overall, cumulative impacts on other wildlife under alternative B would be beneficial. If a decision is made to transition to alternative C, additional impacts on other wildlife and fish could occur, as described for alternative C below.

Alternative C: Incremental Restoration

Predator-Prey Interactions. Alternative C would establish an initial population of 25 grizzly bears in the NCE with a target sex ratio of 60% females to 40% males. Additional bears (1 to 2) could be added every few years to meet restoration objectives. Using the grizzly bear predation rates reported by Mattson (1997), the initial population of 25 adult grizzly bears would on average kill between approximately 35 and 145 ungulates a year, rising to between 280 and 1,160 ungulates a year as the restoration goal of 200 grizzly bears in the NCE is achieved within 60 to 100 years. Based on the conservative ungulate population estimate provided under alternative B, this would be less than 0.2 % of the NCE ungulate population annually for 25 adult grizzly bears, and likely much lower. Even when fully restored, the estimated percent of the ungulate population affected would be less than 2%. Given that grizzly bears have an opportunistic feeding strategy, they would not single out specific species to prey upon; ungulates in areas with higher bear densities could face disproportionate impacts. Overall, grizzly bears are not expected to have any substantial adverse impacts on ungulate populations in the NCE under alternative C.

Interspecific Competition.

Gray Wolf. Short- and long-term impacts on gray wolf under alternative C would be essentially identical to those described for alternative B. Competition between grizzly bears and gray wolves would be unlikely, since documented interactions between grizzly bears and wolves in other ecosystems are usually characterized by mutual avoidance (Servheen and Knight 1990). Additionally, the two species largely use different food sources (Mattson, Blanchard, and Knight 1991). As a result, the likelihood that restoration actions would adversely affect wolves would be small.

Coyote. Because of the coyote's opportunistic feeding strategy and abundance and available habitat, grizzly bears would not likely place any competitive pressure on coyote populations in the NCE under alternative C even when fully restored.

Fisher. Some potential for adverse impacts on fishers would exist under alternative C, similar to those described for alternative B above. The potential for long-term, adverse impacts would be related to both competition and predation as grizzly bear and fisher populations are restored to the NCE. Fishers are mesocarnivores that use a variety of small mammal prey that grizzly bears may also use. The grizzly population is not expected to increase in size sufficiently to adversely affect the fisher through competition or predation. As a result, any long-term, adverse impacts on the fisher are expected to be minimal under alternative C.

Canada Lynx. Under alternative C, potential adverse impacts on lynx would be identical to those described under alternative B; however, additional releases would occur at multiple release sites during the first 5 to 10 years until an initial population of 25 bears is reached. Given the varied and limited distribution of lynx in the NCE and that grizzly bears do not prey on lynx or use similar dens as lynx, the likelihood that restoration actions would adversely affect lynx would be slight.

Cougar. Although some dietary overlap may exist between cougars and grizzly bears, cougars typically do not occupy the same habitat as grizzly bears. In addition, even when fully restored, grizzly bears under alternative C would not consume enough meat to place any competitive pressure on cougar populations in the NCE.

Bobcat. As described for alternative B, bobcats may occasionally use open habitat and meadows that are preferred by grizzly bears, but they tend to prefer steep, rocky terrain. In addition, the generalist diet of bobcats and grizzly bears would not likely result in any competitive pressure between the two species, even when grizzly bears are fully restored under alternative C.

Black Bears. Although some displacement occurs where grizzly and black bears coexist, potential adverse impacts on black bear population dynamics following restoration of a grizzly bear population are unclear but believed to be minimal. Under alternative C, adverse impacts on black bears, if any, are largely expected to be limited to interactions between individual grizzly bears and black bears and are not be expected to affect black bears on a population level.

Helicopter and Other Human Disturbances. Alternative C would require up to four helicopter flights per release. As described in chapter 2, alternative C involves up to approximately 5 to 7 planned releases per year for 5 to 10 years, resulting in at least 100 flights, although some additional flights may be necessary for collar retrieval, release of additional bears, and incidental actions. These helicopter flights would have similar impacts on wildlife as described for alternative B; however, slightly greater than 2.5 times more flights would occur over a longer initial period, although the same number of flights per year is expected as analyzed under alternative B. Impacts associated with noise disturbance and human presence to mammals and birds would be the same as described under alternative B, with varied

responses based on the species. Regardless, associated impacts are unlikely to result in the injury or mortality of individuals and would have no effect on species at the population level.

Fish

Under alternative C, grizzly bear restoration activities would not involve any disturbance of fish habitat. In the short term, the number of grizzly bears in the ecosystem would be very small, and the population is expected to remain confined to the northern portion of the NCE for at least the first several decades following initial restoration activities. While it is possible that grizzly bears, as opportunistic omnivores, could use fish as a food source, fish are not expected to be a primary food source and the number of grizzly bears present in the ecosystem would not be sufficient to create any pressure on fish populations as a result of predation.

Cumulative Effects

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on grizzly bears under alternative C are the same as those described for alternative A.

Ongoing and reasonably foreseeable future activities would have both beneficial and adverse impacts on other wildlife and fish species, but in aggregate, these impacts would be beneficial based on the largely intact available habitat. Alternative C would contribute some limited, short-term, adverse impacts primarily related to helicopter use for releases and seasonal fixed-wing monitoring flights. Long-term effects would be limited to predation and competition; however, impacts would be likely discountable given prey populations and varied life history traits of potential competitors. Overall, cumulative impacts on other wildlife and fish under alternative C would be beneficial.

Conclusion

Under alternative C, the potential would exist for short-term, adverse impacts on other wildlife and fish during active restoration activities. The initial release of 25 grizzly bears into the NCE could result in disturbance to denning mammals or nesting birds as a result of disturbance from helicopter operations in close proximity to active dens or nests. The number of helicopter operations in a given season is expected to be limited to approximately 4 flights per bear, and would be limited to 5 to 7 days per year in mid- to late summer and fall. In the long term, the potential for grizzly bear predation on and/or competition with some wildlife and fish species would be limited. However, given the habitat use, life histories, and other characteristics of many of these species, in combination with grizzly bear life history, habitat use, feeding behavior, and the expected population size and density of grizzly bears that would be present in the NCE, adverse impacts on other wildlife and fish species are not expected to affect species populations and would be largely discountable. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse effects on other wildlife species, but in the aggregate, these impacts would be beneficial. Alternative C would contribute adverse impacts primarily related to helicopter use during initial restoration because of species disturbance, but adverse impacts are not expected following initial restoration. Overall, cumulative impacts on other wildlife and fish under alternative C would be beneficial.

Alternative D: Expedited Restoration

Predator-Prey Interactions. Alternative D would seek to achieve the restoration goal of 200 grizzly bears in the NCE as quickly as possible by translocating between five to seven bears to the NCE each year for approximately 25 years. Adding 5 to 7 grizzly bears to the landscape each year would increase the number of ungulates killed each year by translocated bears; however, because of the rapid nature of

restoration efforts, managers would not be able to be as selective about the sex ratio of translocated grizzly bears as in the other action alternatives, so estimates of ungulates killed annually are much more variable. However, the annual rate would be similar to that described under alternative C, except that the target population would be achieved in approximately 25 years rather than the 60 to 100 years under alternatives B and C. As described under alternative C, even when fully restored, the estimated percent of the ungulate population affected would be less than 2% of the population. Given that grizzly bears have an opportunistic feeding strategy, they would not single out specific species to prey on; ungulates in areas with higher bear densities could face disproportionate impacts. Overall, grizzly bears are not expected to have any substantial adverse impacts on ungulate populations in the NCE under alternative D.

Interspecific Competition.

Gray Wolf and Canada Lynx. Under alternative D, any potential impacts on wolves or lynx would be the same as described under alternatives B and C. However, if adverse impacts did occur, they could persist longer because releases would continue until 200 grizzly bears were restored to the NCE. Given the distribution of wolves and lynx in the NCE and the fact that grizzly bears do not prey on or compete with them, the likelihood that restoration actions would adversely affect wolves or lynx would be slight.

Fisher. Impacts on fisher under alternative D would be similar to those described for alternative C. In the long term, the anticipated grizzly bear population in the NCE under alternative D is expected to be the same as under alternative C. The potential for long-term, adverse impacts on fisher from competition with and predation by grizzly bears would be very low, and the presence of grizzly bears is not expected to affect fisher restoration. As a result, adverse impacts on the fisher as a species are not expected under alternative D.

Coyote. Because of the coyote's opportunistic feeding strategy and abundance and available habitat, grizzly bears would not likely place any competitive pressure on coyote populations in the NCE under alternative D, even when the population is fully restored.

Cougar. Although some dietary overlap may exist between cougars and grizzly bears, cougars typically do not occupy the same habitat as grizzly bears. In addition as described for alternative C, even when fully restored, grizzly bears under alternative D would not consume enough meat to place any competitive pressure on cougar populations in the NCE.

Bobcat. As described for alternative B, bobcats may occasionally use open habitat and meadows that are preferred by grizzly bears, but bobcats tend to prefer steep, rocky terrain. In addition, the generalist diet of bobcats and grizzly bears would not likely result in any competitive pressure between the two species, even when the grizzly bear population is fully restored under alternative D.

Black Bears. Although some displacement occurs where grizzly and black bears coexist, potential adverse impacts on black bear population dynamics following restoration of a grizzly bear population are unclear, but believed to be minimal. Under alternative D, adverse impacts on black bears, if any, are largely expected to be limited to interactions between individual grizzly bears and black bears and are not expected to affect black bears on a population level.

Helicopter and Other Human Disturbances. The use of trucks and helicopters would be necessary to safely and humanely capture, transport, and release grizzly bears. The noise produced by these vehicles, associated human activities, and other disturbances needed to complete the capture and release process would result in impacts on wildlife, including mammals and birds. Impacts on wildlife from helicopter and human disturbances would be similar to the impacts associated with alternatives B and C. Impacts would be limited to times when active restoration activities are ongoing and would be localized to capture

and release sites and helicopter flight paths. Although the annual impacts would be the same as those described under alternatives B and C, they would occur annually for approximately 25 years instead of 5 to10 years for alternatives B and C, equating to around 672 flights (536 more flights than alternative C). Some additional flights may be necessary for collar retrieval and incidental actions, which could result in site abandonment or habituation in staging and release sites as a result of long-term effects from disturbance.

Fish

Under alternative D, long-term impacts on fish from grizzly bear restoration activities would be essentially the same as those described for alternative C. Initial restoration activities would not involve any disturbance of fish habitat. The number of grizzly bears in the ecosystem is expected to grow more rapidly than under alternative C; however, fish are not expected to be a primary grizzly bear food source in the NCE, and the number of grizzly bears in the ecosystem in the first one to two decades would not be sufficient to generate any substantial short-term adverse impacts on fish populations as a result of predation.

Cumulative Effects

Ongoing and foreseeable future activities under alternative D would be the same as those described for alternative A. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse on other wildlife species, but in aggregate, these impacts would be beneficial because of the large amount of undisturbed available habitat. Alternative D would contribute adverse impacts primarily related to helicopter use during active restoration efforts and monitoring for a longer period than the other alternatives considered. However, alternative D would have no lasting adverse impacts on other wildlife or fish populations, although the reestablishment of grizzly bears as part of the ecosystem would result in improved long-term ecosystem health. Overall, cumulative impacts on other wildlife under alternative D would be beneficial.

Conclusion

Under alternative D, the potential would exist for adverse impacts on other wildlife and fish, primarily through active restoration activities. The initial release of grizzly bears into the NCE could disturb denning mammals or nesting birds because of helicopter operations in close proximity to active dens or nests; the potential for these types of adverse impacts on take place would be extended over a longer period of time than under alternatives B and C, but the number of helicopter operations in a given season is expected to be roughly the same under all alternatives. In the long term, grizzly bear predation on and/or competition with some wildlife and fish species could be possible. However, given the habitat use, life histories, and other characteristics of many of these species, in combination with grizzly bear life history, habitat use, feeding behavior, and the expected number of grizzly bears that would be present in the NCE in the long term, adverse impacts on other wildlife species are expected to be minimal. Overall, ongoing and reasonably foreseeable future activities would have both beneficial and adverse on other wildlife species, but in aggregate, these impacts would be beneficial. Alternative D would contribute adverse impacts primarily related to helicopter use, but would have no lasting adverse impacts. The reestablishment of grizzly bears as part of the ecosystem would result in improved long-term ecosystem health. Overall, cumulative impacts on other wildlife and fish under alternative D would be beneficial.

Areas outside the NCE

Although grizzly bears would be released into remote wilderness areas of the NCE, they could move outside of the area into other parts of Washington adjacent to the NCE. Bears that move into suitable

grizzly bear habitat could be left there if they did not pose a risk of coming into conflict with humans and/or livestock. As the population grows, bears could increase movements; however, it is unlikely that a meaningful proportion of the released population would leave the NCE. It is also unlikely that impacts on other fish and wildlife from individual grizzly bears that move outside the NCE would differ from those described for each of the action alternatives.

WILDERNESS CHARACTER

The *Wilderness Act* (16 US C 1131-1136) defines wilderness as "an area untrammeled by man; an area of undeveloped land that retains its primeval character and influence; an area protected and managed to preserve its natural conditions; and, which has outstanding opportunities for solitude or a primitive and unconfined type of recreation" (section 2(c)). The *Wilderness Act* (section 4(c)) also prohibits certain uses within designated wilderness "[…] except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within such area."

NPS wilderness management policies are based on general provisions under Title 54 of the United States Code governing the national park system, the 1964 *Wilderness Act*, NPS director's orders, and legislation establishing individual units. Wilderness areas on NPS land are devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historic use. NPS policy requires that all management decisions affecting wilderness be consistent with the minimum requirement concept defined in the *Wilderness Act*, which is a documented process to determine if administrative actions, projects, or programs undertaken by the park and affecting wilderness character, resources, or the visitor experience are necessary, and if so, how to minimize impacts (NPS 2006).

USFS wilderness management policies are based on general provisions under Title 36 of the United States Code governing the National Forest System, the 1964 *Wilderness Act*, forest plans, and legislation establishing individual units. Wilderness areas on USFS land are meant for multiple uses, protecting wilderness character, and public values including, but not limited to, scientific study, inspiration, and primitive recreation experiences. USFS policy requires that wilderness values dominate over all other considerations except where limited by the *Wilderness Act*, subsequent legislation, or regulations (USFS 2007).

Methods and Assumptions

Potential impacts on wilderness are evaluated qualitatively, based on professional judgment concerning the potential impacts of grizzly bear restoration actions on each of the individual wilderness qualities listed in the affected environment and the effect of grizzly restoration actions on the preservation of wilderness in an unimpaired condition. For more information regarding the potential management actions analyzed below, see appendix F.

Analysis Area. The area of analysis for impacts of the alternatives on wilderness character includes federally designated wilderness areas located within the NCE grizzly bear recovery zone. This includes federally designated wilderness in the park complex, Mt. Baker-Snoqualmie National Forest, and Okanogan-Wenatchee National Forest that may be currently or potentially used as habitat by grizzly bears. Additionally, if grizzly bears that are captured for release into the NCE are sourced from areas located within U.S. federally designated wilderness, the impacts of capture operations on wilderness character in those source areas are analyzed based on the wilderness criteria described in chapter 3.

Issues Analyzed. The analysis of impacts on wilderness character under each alternative is based on the following issue statements that are identified in chapter 1:

> **Issue Statement.** The use of aircraft in the release or monitoring of grizzly bears in designated wilderness areas, should grizzly bears be released and monitored, could adversely affect a number of characteristics, including the undeveloped and opportunities for solitude or primitive and unconfined recreational qualities of wilderness character.
>
> **Issue Statement.** The restoration of grizzly bears would also increase the overall biodiversity present in wilderness areas, increasing the overall benefits to the natural quality of wilderness character and other features of value.

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

Untrammeled. Under alternative A, grizzly bears would not be released into the NCE, resulting in no new impacts on the untrammeled quality of wilderness character.

Natural. Under alternative A, no new impacts on the natural quality of wilderness character would occur because grizzly bears would not be released into the NCE. However, natural ecological systems inside wilderness areas would continue to be adversely affected by the loss of grizzly bears as a native species because they would become extirpated from the NCE given their low numbers and lack of reproduction.

Undeveloped. Under alternative A, grizzly bears would not be released into the NCE by use of motorized equipment, resulting in no new impacts on the undeveloped quality of wilderness character.

Opportunities for Solitude or Primitive and Unconfined Recreation. Under alternative A, there would be no new impacts on opportunities for solitude or primitive and unconfined recreation because grizzly bears would not be released into the NCE. Therefore, taking no action would not result in additional noise or closures in wilderness areas.

Other Features of Value. Under alternative A, grizzly bears would not be released into the NCE, resulting in no new impacts on other features of value. These features, such as historic properties and ongoing scientific study, could continue to offer outstanding opportunities to understand the history and ecology of vegetation, wildlife, fire, geology, and water resources in wilderness areas.

Cumulative Impacts

Alternative A would have no impacts on untrammeled or undeveloped character or opportunities for solitude or primitive and unconfined recreation or other features of value, but the decision to not actively restore grizzly bears to the NCE would affect the natural character of the wilderness. The natural quality of wilderness character could be affected by a number of cumulative actions, including intentional or accidental introduction of non-native and invasive species, air pollution, water pollution, and soil disturbance. However, all federal actions in wilderness would need to comply with the minimum requirements of the law, minimizing potential impacts. Overall, cumulative actions could result in some adverse impacts on wilderness character, specifically the natural quality. Alternative A would contribute a slight adverse increment to overall cumulative impacts on the natural quality because the decision to not restore grizzly bears would likely result in their future absence from the ecosystem.

Conclusion

Under alternative A, no new impacts on wilderness character would occur however, the decision to not restore grizzly bears would adversely affect the natural quality of wilderness if the species were to be lost from the NCE. Cumulative actions would contribute to overall adverse or beneficial impacts on the natural quality, which could be exacerbated by the eventual loss of a species. Overall, alternative A could result in long-term impacts on the natural quality of the wilderness in the NCE.

Alternative B: Ecosystem Evaluation Restoration

Alternative B would release up to 10 grizzly bears over the first 2 years of initial restoration activities, monitor those bears for 2 years, and then make a determination on the release of additional bears. Depending on the outcome of monitoring, managers could decide to repeat the initial release and continue monitoring or transition to alternative C. If managers decide to move toward implementation of alternative C during the adaptive management phase of this alternative, the impacts would coincide with those described for alternative C below.

Untrammeled. Under alternative B, restoring grizzly bears in the NCE would constitute a direct manipulation of the behavior or lives of autonomous animals. There would be intermittent (up to 10 releases over 2 years) and localized (focused at a single release site) adverse impacts on the untrammeled quality of wilderness character related to the release and monitoring grizzly bears or additional translocations of grizzly bears to address mortality, population trends, genetic limitations, distribution, and the sex ratio. Overall, the ecological systems within wilderness in the NCE, along with their biological and physical components, is expected to remain relatively, but not completely, free from human intervention in the form of vehicles and equipment used to release and monitor bears.

Natural. Under alternative B, the restoration of grizzly bears would support recovery of natural conditions in wilderness, notably the restoration of a population of a native species and the ecological functions it serves as a component of the NCE. Minimal adverse impacts on the natural quality of wilderness character could occur as a result of localized disturbance to native vegetation and wildlife species in the vicinity of the release site during active release of grizzly bears. Disturbance would be limited due to the frequency of restoration and monitoring activities over the course of 5 years. Similar localized (limited to a single release site) adverse impacts could also occur as a result of the periodic release of additional grizzly bears or relocation of grizzly bears. These impacts would, however, take place on a highly intermittent basis within the first 5 years under alternative B. Overall, the long-term restoration of grizzly bears, both in terms of their physical presence on the landscape and their role in the terrestrial food web, is expected to have lasting beneficial impacts on the natural quality of wilderness in the NCE because digging and foraging by bears positively influences nitrogen available to plants, as well as seed and nutrient dispersal, and predation on wildlife helps to stabilize the food web.

Undeveloped. Under alternative B, the remoteness and lack of roads in wilderness would necessitate the use of helicopters for releasing grizzly bears. The use of motorized equipment would result in adverse effects on the undeveloped quality of wilderness because, during active release efforts, the imprint of human activity would be noticeable. However, once bears are released, the impacts would cease to occur. Additionally, the placement of culvert traps during release of grizzly bears would adversely affect the undeveloped quality of wilderness character because these traps, although in place for only a few hours per release, would not promote the primeval character and influence of wilderness. These impacts would be limited primarily to the first 2 years of implementation when up to 10 bears would be released around a single release site. These impacts are expected to last for only a few days at a time as bears become available for release and would require 40 helicopter flights spread out over the first 2 years. Overall,

impacts of alternative B on the undeveloped quality of wilderness character in the NCE would be minimal.

Opportunities for Solitude and Unconfined Recreation. Under alternative B, noise would be produced in wilderness from the use of helicopters for the release of up to 10 bears over the first 2 years. Noise is typically measured in A-weighted decibels (dBA), which are an expression of the relative loudness of sounds as perceived by the human ear (OSHA 2013). The U.S. Environmental Protection Agency recommends that in areas of outdoor activity where quiet is a basis of use, the average ambient sound level over a 24-hour period should not exceed 55 dBA (USEPA 1974). A Hughes 500 or similar helicopter would be required during the capture and release of grizzly bears for the action alternative. Federal Aviation Administration testing data (FAA 1977) determined that a Hughes 500 produces between 71 and 90 dBA during hovering, approach, and low speed (airspeed of 69 mph at 500 feet above ground level) flyover maneuvers (FAA 1976). While helicopters would create noise above the ambient sound level at distances over a half mile, the noise would be intermittent and temporary as the helicopter traverses the landscape—lasting seconds to minutes. Furthermore, topography and vegetation would influence the level and distance at which noise would be audible. For a complete discussion of noise impacts as a result of motorized equipment, see "Other Wildlife and Fish" above.

Helicopters would make up to 4 round-trips per grizzly bear (accounting for 40 total trips) and up to 2 landings in wilderness for the release of each grizzly bear, drop-off and retrieval of staff, and drop-off and retrieval of culvert traps, although some additional flights may be necessary for collar retrieval and incidental actions. With the time needed to mobilize and demobilize and potential issues associated with weather conditions, release operations would likely take place over 5 to 7 days annually, depending on available bears. Helicopter flight time over wilderness would likely vary depending on the location of the release site and corresponding staging area. Flight time over wilderness would not exceed 24 hours during each of the first few years of implementation under alternative B. Figure12 shows potential release areas and corresponding staging areas near wilderness. Table 9 provides the range of hours helicopters could be operating over, and in, wilderness.

Release of grizzly bears would take place from mid-summer through early fall. Release activities in wilderness would take place during daylight hours. Closures within the immediate vicinity of ongoing grizzly bear release operations may be required, although attempts would be made to avoid high visitor use areas. These temporary closures are expected to last from a few hours to a few days.

The use of helicopters during release of grizzly bears would have temporary, adverse impacts on opportunities for solitude because the resulting noise would be audible and would disrupt the natural soundscape of wilderness areas. The potential for wilderness users to encounter wildlife management personnel associated with grizzly bear release operations would also have adverse impacts on opportunities for solitude, although given the remoteness of the release sites, chances for encounters would be very low. Even though very limited in size and duration, any temporary closures of areas of wilderness during release of grizzly bears would have adverse impacts on unconfined recreation because they would restrict the recreational activities of some wilderness users. Similarly, but much more intermittently, adverse impacts on opportunities for solitude and unconfined recreation would result from the use of helicopters that periodically release additional grizzly bears as a result of mortality or emigration from the NCE. These impacts are expected to be infrequent, localized, and limited in duration.

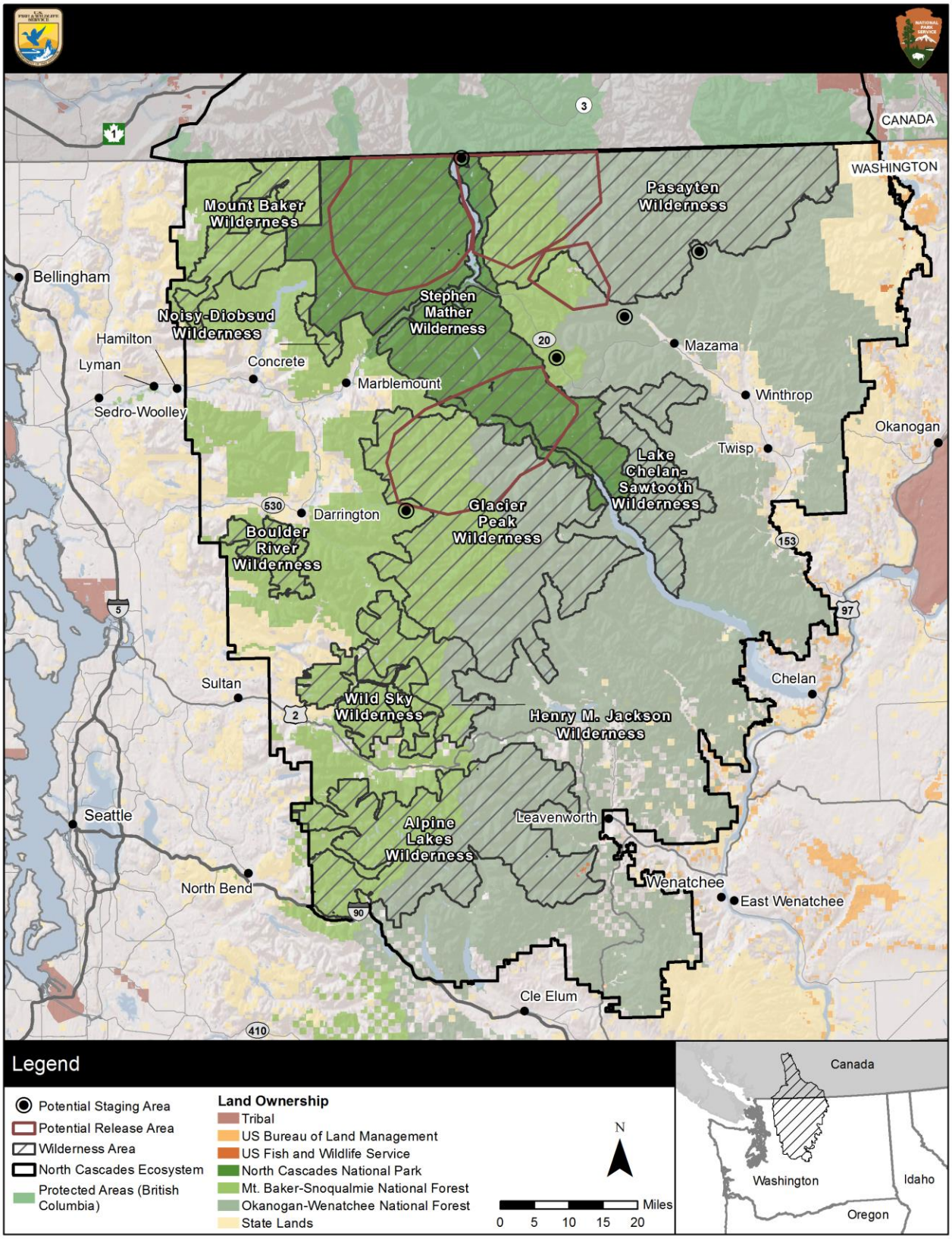

FIGURE 12. POTENTIAL RELEASE AREAS AND FEDERAL WILDERNESS AREAS IN THE NORTH CASCADES ECOSYSTEM

TABLE 9. ESTIMATE OF FLIGHT TIME OVER WILDERNESS*

Proposed Staging Area	Hours Over Wilderness Per Release
Billy Goat	4–4.8
Hozomeen	2.2–3.6
Swamp Creek	0.15–1.8
Green Mountain	1.6–2.4
West Fork Methow	0

*Hours for four round trip flights.

Source: IGBC NCE Subcommittee 2016

Other Features of Value. Under alternative B, no impacts on historic properties are expected. Ongoing scientific study could be affected because the restoration of grizzly bears has the potential to adversely and beneficially affect vegetation and wildlife species in wilderness. The omnivorous diet of the grizzly bear, in combination with habitat requirements, could create localized disturbance to plant and animal species being studied by researchers. However, given the random and isolated locations of vegetation research plots and the limited number of bears being released under this alternative, these impacts would be minimal. Furthermore, having grizzly bears on the landscape would allow for additional research opportunities on a species that has not had a viable population in the NCE in many years, resulting in beneficial impacts on the quality of other features of value. Overall, any adverse impacts are expected to be infrequent, localized, and limited in duration because of the small number of bears released and because alternative B includes monitoring grizzly bear habitat use and instances of human conflict for adjusting future releases.

Impacts on Wilderness Character in Grizzly Bear Source Areas

If grizzly bear source populations are in wilderness areas, the impacts on wilderness character in the source areas would be similar to those described above for release areas because the equipment and procedures used, and the timing and duration of capture operations would be similar. Capture would include the use of helicopters, trucks in accessible areas, culvert traps, snares, and area closures. Capture operations in source area wilderness would have adverse impacts on all of the qualities of wilderness character described above and would be identical to those described for wilderness areas in the NCE. Adverse impacts related to periodic capture of additional grizzly bears necessary to address potential mortality or emigration from the NCE could also occur. The major difference between the impacts on wilderness in the NCE and the impacts on source area wilderness would be that the capture of grizzly bears would have adverse impacts on the natural quality of source area wilderness. These adverse impacts would result from capturing and permanently removing individual grizzly bears from the source area landscape and food web. Source areas would be chosen in part because the grizzly bear populations in those areas would be at sufficient levels to withstand the loss of a small number of individual grizzly bears. Therefore, adverse impacts on the natural quality of source area wilderness are expected to be minimal.

Cumulative Impacts

The untrammeled quality of wilderness character could be adversely affected by fire suppression and non-native fish management. Whereas, the natural quality of wilderness character could be affected by a number of factors, including accidental introduction of non-native and invasive species, air pollution, water pollution, soil disturbance, and climate change. The undeveloped quality of wilderness character

could be affected by a number of existing facilities and the use of motorized equipment. Opportunities for solitude or primitive and unconfined recreation could be affected by light pollution, noise intrusions, the backcountry permit system, group size restrictions, campfire limitations, food storage policies, and campsite restrictions. No impacts are expected to other features of value. Overall, cumulative actions would result in adverse impacts on wilderness character. It is likely that alternative B would contribute to the overall cumulative impacts from the actions associated with the release and subsequent management of grizzly bears, but the adverse contribution of alternative B would be minimal given the limited number of days that grizzly bear release operations would occur and would be offset by the ultimate restoration of a component of the natural landscape, a beneficial impact, if managers decide to transition to alternative C.

Conclusion

The implementation of alternative B would result in adverse and beneficial impacts on wilderness and long-term, beneficial impacts on wilderness character. This alternative would restore up to 10 grizzly bears over the first 2 years of initial restoration activities. The duration of impacts on the qualities of wilderness character would likely be short during the primary phase, only occurring during releases. Intermittent and localized, adverse impacts would occur from monitoring grizzly bears or additional translocations of grizzly bears to address issues with mortality, population trends, genetic limitations, distribution, or the sex ratio. However, the restoration of grizzly bears would benefit the natural value of wilderness because the species is largely absent from the NCE with only one to two sightings in the last 10 years. When combined with other past, present, and reasonably foreseeable future actions, the cumulative actions of alternative B would result in adverse impacts on wilderness character as a result of the methods used for restoration, and the adverse contribution of alternative B to these cumulative actions would be minimal. However, the limited, adverse impacts from alternative B would be offset by initiating the restoration of a native species, a beneficial impact. Additional benefits would be realized if managers ultimately transition to alternative C and continue to restore the species.

Alternative C: Incremental Restoration

Untrammeled. The magnitude of impacts on the untrammeled quality of wilderness character associated with the release of grizzly bears would be similar to alternative B, although the impacts would extend for additional years. Under alternative C, the release of grizzly bears into wilderness would constitute direct manipulation of the behavior or lives of autonomous animals. Alternative C would have adverse impacts on the untrammeled quality of wilderness character as a result of restoration activities. Intermittent and localized, adverse impacts on the untrammeled quality of wilderness would occur related to capturing and releasing bears; monitoring grizzly bears; or releasing additional grizzly bears to address mortality, population trends, genetic limitations, or the sex ratio. The primary restoration phase would be limited to the release of 5 to 7 bears over a 5 to 10 year period until a population of 25 bears is achieved, although agencies could supplement the population every few years through the release of 1 to 2 bears. Overall, ecological systems within the wilderness in the NCE, along with their biological and physical components, are expected to remain relatively but not completely free from human intervention.

Natural. Under alternative C, adverse impacts on the natural quality of wilderness character would be likely, as a result of localized disturbance to native vegetation and wildlife species in the vicinity of the release sites. However, disturbance would be limited because of the frequency of restoration activities over the course of 5 to 10 years. Similar localized, adverse impacts may also occur as a result of periodic release of additional grizzly bears or relocation of grizzly bears. These impacts would, however, take place on a highly intermittent basis (every few years). The restoration of grizzly bears, both in terms of their physical presence on the landscape and their role in the terrestrial food web, would have lasting beneficial impacts on the natural quality of national park and national forest wilderness areas in the NCE.

Undeveloped. Under alternative C, impacts would be similar to those described for alternative B from the use of motorized equipment, although the primary phase would last longer (5 to 10 years). Adverse effects on the undeveloped quality of wilderness character would occur because the imprint of human activity from helicopter use would be noticeable. Additionally, the temporary placement of culvert traps during the release of grizzly bears would adversely affect the undeveloped quality of wilderness character because these traps would not promote the primeval character and influence of wilderness. However, these traps would be removed immediately once bears have been released. Overall, the adverse impacts of alternative C on the undeveloped quality of wilderness character in the NCE would be minimal.

Opportunities for Solitude or Primitive and Unconfined Recreation. Under alternative C, the use of motorized equipment and presence of wildlife management personnel associated with grizzly bear release operations would adversely affect opportunities for solitude because the resulting noise and visual disturbance would affect the landscape and soundscape. The potential for closures of various portions of wilderness areas, if necessary during release of grizzly bears, would adversely affect unconfined recreation because the closures would restrict the recreational activities of wilderness visitors. Adverse impacts on opportunities for solitude associated with helicopter noise would occur with more frequency, with approximately 100 to 136 helicopter round trips. Impacts on unconfined recreation would result from the use of helicopters to periodically release additional grizzly bears or to place culvert traps and transport wildlife management personnel during relocation or removal of conflict grizzly bears. It is expected that these impacts would be infrequent, localized, and limited in duration.

Other Features of Value. Under alternative C, no impacts on historic properties are expected. Ongoing scientific study could be affected since the restoration of grizzly bears has the potential to adversely and beneficially impact vegetation and wildlife species in wilderness. The omnivorous diet of the grizzly bear, in combination with habitat requirements, could create localized disturbance to plant and animal species being studied by researchers. However, given the random and isolated locations of vegetation research plots, along with the limited number of grizzly bears being introduced under this alternative, these impacts would be minimal. Furthermore, having grizzly bears on the landscape would allow for additional research opportunities regarding a species that has not had a viable population in the NCE in many years, resulting in beneficial impacts on the quality of other features of value of wilderness character.

Impacts on Wilderness Character in Grizzly Bear Source Areas

If grizzly bear source populations are identified in wilderness areas, the impacts on wilderness character in the source areas would be similar to those described under alternative B because the equipment and procedures used and the timing of capture operations would be the similar, although the duration would be 5 to 10 years.

Cumulative Impacts

Cumulative actions under alternative C would be similar to those described for alternative B. It is likely that alternative C would contribute to the overall cumulative effects from the actions associated with the release and subsequent management of grizzly bears, although the contribution of adverse impacts from alternative C would be minimal. However, alternative C would also provide lasting benefits to wilderness through the reestablishment of a native species.

Conclusion

The implementation of alternative C would result in both adverse impacts and beneficial impacts on wilderness character in the NCE. The qualities of wilderness character such as untrammeled, undeveloped, and opportunities for solitude and unconfined recreation would be adversely affected during

grizzly bear restoration activities over the course of 5 to 10 years. These impacts include the manipulation of the ecosystem and use of motorized vehicles (helicopters). However, the restoration of the grizzly bear would result in benefits to the natural quality of wilderness as it will restore a native species to the ecosystem. Overall, cumulative actions would result in adverse impacts on wilderness character, and the adverse contribution of alternative C to these cumulative actions would be minimal. However, alternative C would also provide lasting benefits to wilderness by restoring a native species.

Alternative D: Expedited Restoration

Untrammeled. The magnitude of impacts on the untrammeled quality of wilderness character associated with the release of grizzly bears would increase under alternative D because active restoration would last approximately 25 years. Similar to alternatives B and C, restoring grizzly bears in the NCE would constitute direct manipulation of the behavior or lives of autonomous animals under alternative D. Because alternative D involves the release of a considerably larger numbers of grizzly bears (up to 168 grizzly bears), the duration of trammeling impacts would be longer than those described under alternative C. Intermittent and localized, adverse impacts would occur on the untrammeled quality of wilderness character related to monitoring grizzly bears or removing or relocating conflict grizzly bears.

Natural. Under alternative D, the impacts on the natural quality of wilderness character associated with the release of grizzly bears would likely increase due to the frequency of disturbance to native vegetation and wildlife species in the vicinity of release sites, as multiple release sites would be used, over the course of 25 years. However, like alternative C, it is expected that the restoration of grizzly bears, both in terms of their physical presence on the landscape and their role in the terrestrial food web, would have lasting beneficial impacts on the natural quality of national park and national forest wilderness areas in the NCE.

Undeveloped. Under alternative D, the impacts on the undeveloped quality of wilderness character associated with the release of grizzly bears would likely increase due to the increased frequency of helicopter overflights (totaling 672) and use of culvert traps related to additional grizzly bears being released over time compared to alternative C.

Opportunities for Solitude and Unconfined Recreation. Under alternative D, the impacts on opportunities for solitude and unconfined recreation associated with the release of grizzly bears would be greater than those described under alternative C. Increases in the use of motorized equipment and presence of wildlife management personnel would result in adverse impacts on opportunities for solitude. For example, adverse impacts associated with noise from helicopter flights associated with alternative D would be more pronounced than under alternative C, given a greater number of flights (i.e., 4 flights per bear) with 672 flights, although some additional flights may be necessary for collar retrieval and incidental actions. The resulting noise and visual disturbance would affect the landscape and soundscape over the course of 25 years, but only during the release periods. The potential for an increase in temporary closures in wilderness during the release of grizzly bears would have adverse impacts on unconfined recreation because closures would restrict the recreational activities of wilderness visitors. Any closure would be limited in nature as described in alternatives B and C, but the closures could occur more repeatedly, related to the number of years of active restoration.

Other Features of Value. Under alternative D, no impacts on historic properties are expected. Ongoing scientific study could be affected since the restoration of grizzly bears has a potential to adversely and beneficially impact vegetation and wildlife species in wilderness. The omnivorous diet of the grizzly bear, in combination with habitat requirements, would create localized disturbance to plant and animal species being studied by researchers. However, given the random and isolated locations of vegetation research plots, along with the size of the area and the continued low density of the grizzly bears population, these impacts would be minimal. Having grizzly bears on the landscape would, however, allow for additional

research opportunities on a species that has not had a viable population in the NCE in many years. This would result in beneficial impacts on the quality of other features of value of wilderness character.

Impacts on Wilderness Character in Grizzly Bear Source Areas

If grizzly bear source populations are identified in wilderness areas, the impacts on wilderness character in the source areas would be similar to those described under alternative C because the equipment and procedures used and timing of capture operations would be similar; however, capture efforts would extend for up to 15 additional years under this alternative compared to alternative C, substantially extending adverse impacts on wilderness character over time.

Cumulative Impacts

Cumulative actions under alternative D would be similar to those described for alternative C. It is likely that alternative D would contribute to the overall cumulative effects from actions associated with the release and subsequent management of grizzly bears, which could amplify adverse impacts on wilderness character, although the adverse contribution from alternative D would be minimal. However, alternative D would also provide lasting benefits to wilderness through the reestablishment of a native species that have not had a viable population in the NCE in many years.

Conclusion

The implementation of alternative D would result in adverse impacts associated with the release and management of grizzly bears restored to the NCE and lasting beneficial impacts on wilderness character. These impacts are similar to those described under alternative C; however, adverse impacts would continue for up to 15 additional years, substantially extending the impacts on wilderness character over time. Overall, cumulative actions would result in adverse impacts on wilderness character, and the adverse contribution of alternative D to these cumulative actions would be minimal. However, like alternative C, alternative D would also provide lasting benefits to wilderness by restoring a native species that has not had a viable population in the NCE in many years.

Areas outside the NCE

Although grizzly bears would be released into remote wilderness areas of the NCE, they could move outside of the area into other parts of Washington adjacent to the NCE. Bears that move into suitable grizzly bear habitat would be left there if they did not pose a risk of coming into conflict with humans and livestock. This is especially true of other wilderness areas outside the NCE. As the population grows, bears could increase movements; however, it is unlikely that a meaningful proportion of the released population would leave the NCE. If grizzly bears move into other wilderness areas where they have been absent, they would improve the overall wilderness character of the area.

In the event that the option to designate the NCE population of grizzly bears as a section 10(j) experimental population is implemented, additional management measures may become available to managers to use non-lethal measures to reduce impacts by grizzly bears that move outside NCE or to mitigate human-grizzly bear conflicts, including those that could occur in wilderness areas.

VISITOR USE AND RECREATIONAL EXPERIENCE

Methods and Assumptions

The potential impacts of the alternatives on visitor use and recreational experience were evaluated qualitatively based on resource expert knowledge and professional judgment; review of visitor use statistics for park and national forest visitors; and information provided by the NPS, FWS, and USFS recreation, natural resources, and public information experts. To assess impacts on visitor use and recreation, the current types of visitor uses in areas where grizzly bears may be encountered were considered, and the potential effects of the implementation of the alternatives on visitor use and recreation were analyzed. Additionally, the level and regularity of various types of noises experienced by visitors were considered, and the potential for impacts on visitor use and recreation attributable to effects on the natural soundscape were analyzed.

Analysis Area. The area of analysis for impacts of the alternatives on visitor use and experience comprises the NCE grizzly bear recovery zone where grizzly bear restoration activities and subsequent grizzly bear habitat use may overlap with visitor use.

Issues Analyzed. The analysis of impacts on visitor use and recreational experience under each alternative is based on the following issue statements that are identified in chapter 1:

> **Issue Statement.** The restoration of grizzly bears to the NCE could increase visitation and recreational use of the park and national forests as visitors seek to experience grizzly bears in their native habitat.
>
> **Issue Statement.** Restoration actions that result in an increased grizzly bear population could also affect recreational opportunities for visitors who do not wish to encounter grizzly bears.
>
> **Issue Statement.** Depending on the type and location of visitors' attitudes and preferences, there would be varying effects on visitor use and recreation related to area closures during ongoing grizzly bear restoration activities, noise, and the visible presence of helicopters, as well as the potential for human-grizzly bear encounters as initial restoration activities give way to adaptive management activities.

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

As discussed in chapter 1, it is highly unlikely that the NCE contains a viable grizzly bear population, and natural recovery in the NCE is thus not expected to occur. Consequently, under the no-action alternative, impacts on existing visitor use patterns and recreational opportunities are not expected. The majority of visitors are expected to continue to visit the NCE with little change in their trip frequency or length. Visitors who are in favor of the restoration of grizzly bears and who believe that the presence of grizzly bears would constitute a unique recreational/outdoor experience would be denied that experience in the NCE under the no-action alternative, but that would not be a change from existing conditions.

Implementation of the no-action alternative would maintain the status quo, as NPS and USFS personnel would continue to promote public education, outreach, and sanitation measures, as discussed previously. Continued public education and management efforts would benefit visitors by fostering awareness, promoting behavior modification, and encouraging coexistence between people and bears. The NPS, USFS, and FWS would continue to encourage recreational visitors and hunters to report potential grizzly

bear sightings as well as black bear sightings. Existing black bear interactions with wildlife and humans would likely remain unchanged. Popular recreational activities such as hiking, camping, mountaineering, winter sports, boating, and fishing would be likely to continue unchanged under the no-action alternative.

Cumulative Effects

Because alternative A is unlikely to affect visitor use or recreational experience, no cumulative impacts would occur under alternative A.

Conclusion

Under the no-action alternative, grizzly bear restoration activities would not occur in the NCE. Therefore no direct, indirect, or cumulative impacts on visitor use and recreational experience are expected compared to existing conditions.

Alternative B: Ecosystem Evaluation Restoration

Alternative B would release up to 10 grizzly bears over the first 2 years of initial restoration activities, monitor those bears for 2 years, and then make a determination on the release of additional bears. Depending on the outcome of monitoring, managers could decide to repeat the initial release and continue monitoring or transition to alternative C. If managers decide to transition to the implementation of alternative C during the adaptive management phase of this alternative, the impacts would coincide with those described for alternative C, below.

Under alternative B, potential beneficial and adverse impacts on visitor use and recreational experience could result from the initial restoration of grizzly bears in the NCE. Because grizzly bears have a high profile worldwide, and because they are rare in the contiguous 48 states, visitation could increase or decrease depending on visitor interest in or aversion to them. Some visitors may perceive the opportunity to view a grizzly bear as a unique recreational experience because grizzly and other bears are deeply embedded in the myths and social constructions of American society. Impacts would be beneficial for those visitors who feel that the presence of grizzly bears and restoration of a large native mammal that is an important part of the terrestrial food web enhances their wilderness experience. Impacts would be adverse for those visitors who do not wish to encounter grizzly bears.

Public outreach and education would be more comprehensive under alternative B than under the no-action alternative. These measures would have beneficial impacts by teaching members of the public about grizzly bear behavior and natural history, while educating them to recognize signs that grizzly bears are in the area. Management efforts in the front country would continue to be directed at minimizing attractants and deterring grizzly bears from easily accessible areas developed for high human use. Visitor compliance with NPS and USFS policies designed to protect natural resources would likely enhance their unique recreational experiences by mitigating the potential for human-grizzly bear conflict. Public acceptance and perceptions may change as grizzly bears increase in number over time and begin to use habitat over a larger area of the ecosystem.

Grizzly bears would be released away from areas of high visitor use, including motorized roads, campsites, and trails. It is assumed that any trail and/or area closure would be very temporary, localized, and limited to a few hours to a few days, and adverse impacts are not anticipated to occur outside wilderness/backcountry areas. As discussed in the “Wilderness Character” section, these temporary closures could have adverse impacts on unconfined recreation because they could restrict the recreational activities of some wilderness users. All released grizzly bears would be monitored to keep the public informed of restoration efforts.

Generally, adverse noise impacts on visitor use and recreational experience from helicopter flights associated with alternative B would be limited in duration to the 40 trips necessary to release 10 bears and would only occur in a certain portion of the NCE. Efforts would be made to avoid trails and campgrounds by using a single, remote release site (figure 13).

Helicopters would take the most efficient routes to and from the release site, reducing the duration spent over campsites or along trails. When landing and taking off from staging areas and release sites, helicopters could be audible to humans above the ambient sound level for approximately 0.5 mile. At approximately 650 feet from the staging areas and release site, helicopter noise would be audible at or above approximately 60 dBA, which is the threshold for interruption of normal voice communications at 3 feet. Under the primary phase of alternative B, approximately 40 total round-trip helicopter flights in the NCE would occur per year for the first 2 years for the release of up to 5 bears per year. It is unlikely that more than 1 bear would be released in a given day, and helicopter operations would require a maximum of 8 total flying hours in a given day during first two seasons. See table 12 in the "Wilderness" section regarding the range of hours helicopters could be operating over wilderness. The management window for helicopter-based capture and release would be approximately 10 days each year in late summer. However, given the single, remote location of a release area in the northern portion of the NCE under this alternative, the probability of many human visitors being affected by noise is low.

Staging areas in general are not located near heavy visitor use areas; the exception to this is the Hozomeen Campground near the Canadian border. Similar but much more intermittent adverse impacts on opportunities for solitude and unconfined recreation would result from the use of helicopters to place culvert traps and transport wildlife management personnel during relocation or removal of conflict grizzly bears. These impacts are expected to be infrequent, localized, and limited in duration.

Helicopter operations are not uncommon in the NCE. As discussed under the "Wilderness" section of chapter 3, flight hours over wilderness average approximately 142 hours per year. The majority of these flight operations stemmed from active fire management operations, with high activity during 2009, 2010, and 2014. Grizzly bear helicopter operations are expected to take place over a total of 2 years, which would limit impacts on individual visitors at any given time in any given location. Some visitors may perceive the noise and frequency of helicopter operations as an impact on the tranquility and ecology of the setting. Adverse impacts on the natural visual landscape resulting from such operations would be temporary, intermittent, and would vary based on an individual's position on the landscape and distance from ongoing restoration activities. Because the release of grizzly bears would take place from mid-summer through early fall, visitors would not experience helicopter related noise impacts during the winter and spring.

The potential frequency and duration of additional grizzly bear capture and release activities beyond the primary phase is unknown and would be influenced by the population size, distribution relative to visitor use on the landscape, available funding and personnel, and other management considerations. However, the impacts would be similar to those described above. The intensity of adverse impacts would vary based on the location, frequency, and timing of restoration activities.

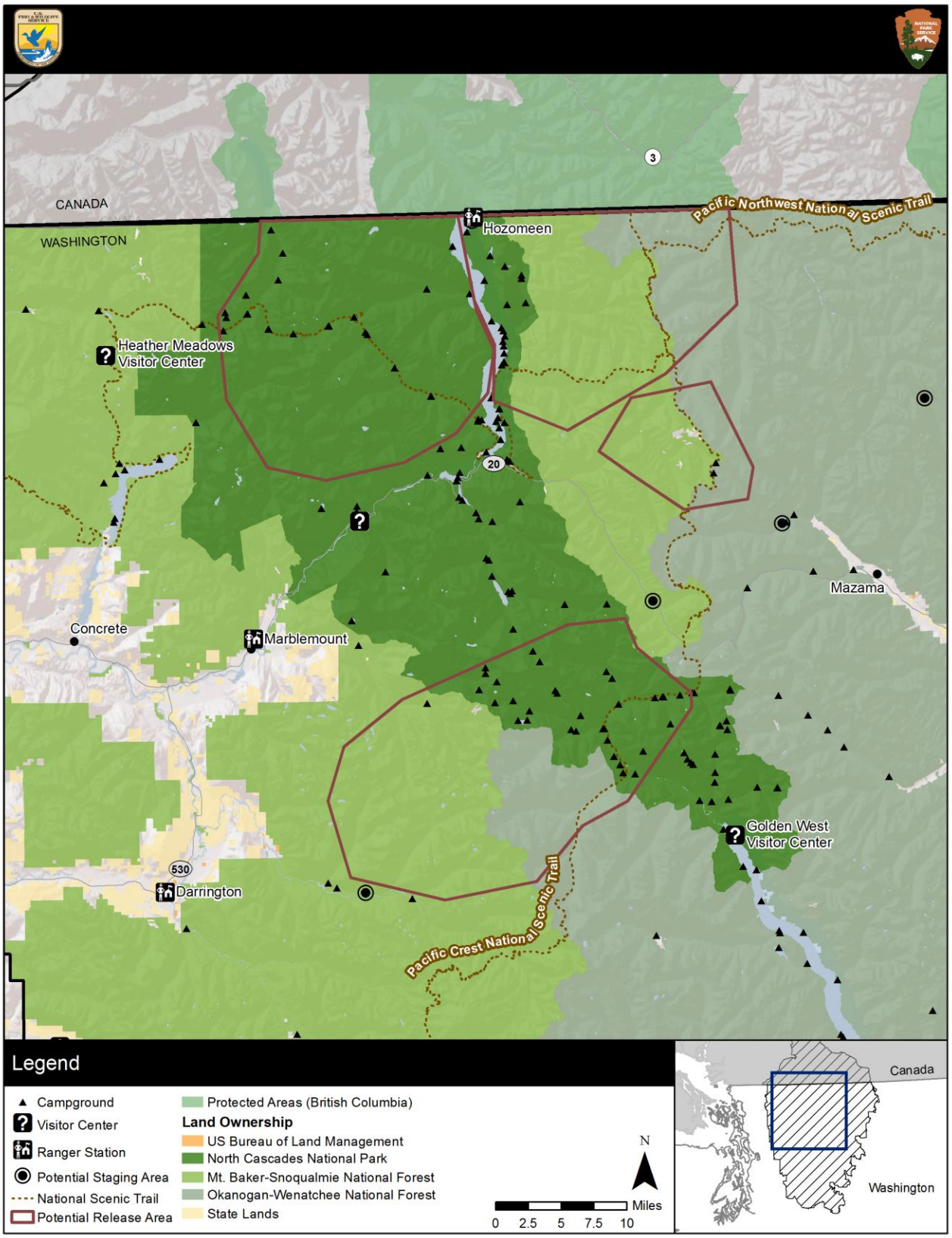

FIGURE 13. POTENTIAL RELEASE AREAS AND RECREATIONAL SITES IN THE NORTH CASCADES ECOSYSTEM

Some front country areas that may be highly desirable to visitors (i.e., ranger stations, highways, roads used by visitors to access front country areas, and locations proximate to bathroom facilities, picnic grounds, campsites, and boat launches) are not typically preferred habitat for seasonal grizzly bear use; therefore, adverse impacts on these areas would be unlikely, especially given the small number of grizzly bears to be released initially and the designation of a single release site. Closure of park or forest facilities and main roads are not expected to occur. Given that only two trails were temporarily closed on national forest lands in the NCDE because of grizzly bears in the 10-year period from 1990 to 2000 (FWS 2016d), it is reasonable to assume that any trail and area closures would be temporary, localized, and limited.

In the event of a human-bear conflict, the 2002 Interagency Grizzly Bear Committee (IGBC) Guidelines for the NCE would govern actions (see discussion in chapter 2 and appendix E). Bear-human conflict can occur in diverse locations (residential, rural, agricultural, and backcountry), so real-time information is essential for effective management. Analysis of habitat use would help NPS, USFS, FWS, and WDFW personnel determine what makes certain areas conducive to grizzly bear activity and how to prevent conflicts from occurring in the future. During the primary phase of restoration under alternative B, habitat use and human-bear conflict would be monitored. Data collected during this period would help agency personnel make decisions regarding future release sites before additional bears are released into the landscape. Management decisions would be made in the context of reducing the probability of bear-human conflict, as well as preferred habitat.

As grizzly bears increase in number over time and begin to use habitat over a larger area of the NCE, the potential for humans to encounter them would exist over a greater geographical range, which could provide benefits for those visitors hoping to experience grizzly bears in the natural environment, while dissuading some other visitors from recreating in the NCE. Given the amount of recreation that occurs in other grizzly bear ecosystems associated with Glacier National Park and Yellowstone National Park, it is unlikely that adverse impacts would limit visitor use and experience of the NCE.

The potential impacts on recreation from monitoring bear movements and habitat use would be restricted to the potential for fixed-wing flights, similar to those currently occurring for other purposes under the no-action alternative. Therefore, bear monitoring is unlikely to adversely affect visitor use or recreational experience to the point that experiences are diminished.

Cumulative Effects

Present and ongoing actions with the potential to result in cumulative impacts on visitor use and experience include ongoing road maintenance, trail maintenance and repairs, wildlife monitoring, invasive plant management within wilderness areas, and fire management. Ongoing road maintenance would result in adverse impacts during the construction phase such as temporary road closures, traffic interruptions, and traffic delays. Timely road maintenance is important because it sustains the quality and safety of the road in a condition close to the original design and minimizes the user costs by reducing wear to vehicles. Proper road maintenance would provide indefinite benefits by ensuring visitors unimpeded access to recreational areas and ease of travel. Trail maintenance would also have indefinite beneficial impacts on visitor use and experience through the continued provision of a well-maintained trail system.

Efforts by NPS and USFS personnel to monitor and maintain natural resources on federal lands would have overall beneficial impacts on visitor use and experience. For example, specific areas may be temporarily closed during invasive plant management activities, forcing some visitors to take alternate trails or camp in different areas. However, the eradication of invasive plants would improve the survival of native species, allowing visitors to experience a more intact native ecosystem. Ski area expansion projects would likely have beneficial impacts on visitor use and experience by expanding opportunities

for winter recreation. River and aquatic restoration projects may yield adverse impacts by temporarily inconveniencing anglers, but could lead to indefinite beneficial impacts, by improving habitat for native species. During restoration activities, such as sampling, surveying or shoreline/habitat restoration, anglers may be prohibited from fishing in certain areas. Temporary use restrictions may also be an issue for recreational visitors seeking to use canoes, kayaks, and boats.

Actions prescribed in existing management plans, such as the *Stephen Mather Wilderness Management Plan*, would continue to allow for long-term, beneficial impacts on visitor use and experience. Wilderness management, such as the issuance of special-use permits, has the potential to reduce human-to-human contact and enhanced visitors wilderness experience (NPS 1989). Mountain lakes restoration would continue to improve existing ecological conditions, while providing sport-fishing opportunities in reservoirs, rivers and streams, and select mountain lakes within each of the three units of park complex (NPS 2011a). The removal of non-native fish could produce long term, adverse impacts on anglers who fish in those lakes slated for fish removal. Stocking trout where they did not originally exist was an accepted practice in the North Cascades under a 1988 agreement between the State of Washington and NPS (NPS 2008a). However, this practice does not comport with NPS *Management Policies 2006*, and it is prohibited in other national parks (NPS 2008a). Following an extensive environmental review, including a 12-year scientific study, the NPS decided to end fish stocking if it did not receive Congressional approval by July 1, 2009. This decision was later amended by the *North Cascades National Park Service Complex Fish Stocking Act*, signed into law on July 25, 2014. The law requires the Secretary of the Interior to stock only fish that are: (1) native to the slope of the Cascade Range on which the lake to be stocked is located; and (2) non-reproducing, as identified in management alternative B of the *North Cascades National Park Service Complex Mountain Lakes Fishery Management Plan and Environmental Impact Statement*. Anglers may be inconvenienced by implementation of the mountain lakes restoration program if they are trying to catch a specific variety of fish in a non-native aquatic environment where fish are no longer stocked.

Pack and saddle stock outfitter guided activities would continue to cause isolated disturbances to lakeshores, stream crossings, trails, and wetland/riparian areas (USFS 2010). Visitors may experience temporary adverse impacts from these activities as they disturb the natural conditions of wilderness areas. Visitors may also experience beneficial impacts, as guided activities such as horseback riding are unique experiences.

Heavy metals and process chemicals from mining activities within the NCE have the potential to negatively impact humans (USEPA 2000). Additionally, toxic levels of heavy-metal residues generated by mining operations are a health threat to surrounding watersheds and drainage areas where fishery resources are highly valued aspects of recreation and tourism (USEPA 2000). The long-term impact of cleaning up these sites under CERCLA would produce beneficial impacts on visitors use and experience. Because current mining activities and CERCLA mine cleanup projects often produce localized, adverse impacts (e.g., dust and noise), restricting access is used to minimize access to areas where there may be an exposure. For example, USFS (in concert with the US Environmental Protection Agency) could restrict the use of off-road vehicles in an area where the use could damage the remediation and allow contaminants to be released by erosion (e.g., air or surface water). Hikers would be forced to navigate alternate routes if they encounter fencing or posted signs. Such adverse impacts would probably not be widespread and would not affect most visitors to the NCE.

Aviation activities over parks include general aviation, commercial passenger flights, park maintenance, and fire and emergency operations. Excessive aircraft noise may produce adverse impacts such as annoyance or interference with the uses and enjoyment of natural areas and can adversely affect wildlife (NPS 2016g). NPS Overflights and Aviation Uses Policy 8.4 mandates that private or commercial aircraft may be operated in parks only on lands or water surfaces designated by the NPS as landing sites through

special regulations (NPS 2016g). The types of aircraft generating noise exposure are important, as visitors have shown greater negativity regarding helicopters than fixed-wing aircraft, propeller planes, and high-altitude jets (TRB 2013). Helicopter flights, such as for search and rescue and fire operations, would continue to produce intermittent noise impacts. Such impacts could temporarily detract from visitors experience by limiting opportunities for viewing wildlife.

Overall, the cumulative impacts of past, present, and reasonably foreseeable actions on visitor use and experience would be beneficial because the intermittent, brief disruptions to visitor use that may be associated with certain activities (e.g., CERCLA cleanups, ski area expansion projects) would be offset by the long-term benefits to visitor use and recreational experience. Under alternative B, restoration activities would produce a combination of beneficial and adverse impacts on visitor use and experience associated with increased temporary noise during restoration activities and the restoration of grizzly bears in the NCE. Overall, cumulative impacts on visitor experience and recreational use would be largely beneficial when analyzed beyond the period of initial visitor disturbance (i.e., generally expected to be 2 years in duration), and alternative B would contribute a small beneficial increment to the overall cumulative impacts.

Conclusion

Overall, the impacts of alternative B on visitor use and recreational experience would be varied, but limited given the small number of bears released into the ecosystem. Under alternative B, initial restoration activities in grizzly bear habitat would result in potential adverse impacts over a 5-year time frame as a result of the increased potential for human-grizzly bear conflicts due to the increased number of grizzly bears in the ecosystem. The potential for conflicts to occur is expected to remain low because the number and population density of grizzly bears on the landscape would remain very low (approximately 10 bears), limiting the probability that visitors would encounter them. Additionally, the location of the release sites in high quality grizzly habitat away from main visitor areas would mitigate the potential for human-grizzly interactions. Adverse impacts associated with intermittent, brief disruptions to visitor use that may be associated with certain activities (e.g., helicopter flights) would be offset by the benefits of grizzly bears being restored to a native ecosystem. Grizzly bears are a high profile species with interest worldwide. As such, some visitors may perceive the presence of grizzly bears as enhancing the depth of visitor experience and a unique opportunity. Other visitors may avoid the NCE given a fear of grizzly bears. Since road and trail access will not be restricted, there would be no change from the existing condition. Cumulative impacts resulting from other management actions (repair and maintenance of trails and infrastructure, removal of invasive species, and habitat restoration projects) would be an improvement to existing conditions and would combine with alternative B to provide overall benefits.

Alternative C: Incremental Restoration

Under alternative C, the primary phase of grizzly bear restoration would occur over 5 to 10 years, although the agencies may release additional bears (1 to 2) every few years to help meet restoration objectives. Visitation could increase or decrease depending on visitor interest in or aversion to grizzly bears. As with alternative B, impacts would be beneficial for those visitors who feel that the presence of grizzly bears would enhance their wilderness experience by restoring a large native mammal that is an important part of the terrestrial food web. Impacts would be adverse for those visitors who fear grizzly bears and do not wish to encounter them.

Public outreach and education would be the same as discussed under alternative B. As with alternative B, these measures could help reduce human-grizzly bear conflicts and associated adverse impacts.

Under alternative C, grizzly bears would be released away from areas of high visitor use, including motorized roads, campsites, and trails, however there would be more than one release site under alternative C. It is assumed that any trail and area closures would be very temporary, localized, and limited to a few hours to a few days, and adverse impacts are not anticipated to occur outside backcountry areas. As discussed in both the "Wilderness character" section and under alternative B, these temporary closures could have adverse impacts on unconfined recreation because they would restrict the recreational activities of some wilderness users. As with alternative B, all released grizzly bears would be monitored to keep the public informed of restoration efforts, and to inform further releases.

Generally, adverse impacts from noise on visitor use and experience from helicopter flights associated with alternative C would be similar to those described under alternative B, but the number of flights would be higher. Under alternative C, between100 to 136 flights would be required to transport and release bears increasing the potential risk for adverse impacts associated with noise disturbance to visitors, though additional flights could be required in the future to supplement the grizzly bear population. However, helicopter operations at NCE are not uncommon, as described under alternative B. It is expected that helicopter operations would take place over a total of 5 to 10 years, which would limit impacts on individual visitors at any given time in any given location. Similarly, adverse impacts on the visual landscape would be temporary, intermittent, and would vary based on an individual's position on the landscape and distance from ongoing restoration activities.

The potential frequency and duration of additional grizzly bear capture and release activities beyond the primary phase is unknown, and would be influenced by the population size, distribution relative to visitor use on the landscape, available funding and personnel, and other management considerations. However, the impacts would be similar to those described above.

The intensity of adverse impacts would vary based on the location, frequency, and timing of restoration activities. As with the other alternatives, as the grizzly bear population approaches the restoration goal, the potential for human-grizzly bear interaction could increase, causing an increase in beneficial and adverse impacts associated with grizzly bear presence and potential conflicts with visitors, as described in alternative B.

Some frontcountry areas that may be highly desirable to visitors (i.e., ranger stations, highways, and roads used by visitors to access front country areas, and locations proximate to bathroom facilities, picnic grounds, campsites, and boat launches) are not typically preferred habitat for seasonal grizzly bear use; therefore, adverse impacts on these areas would be unlikely, especially given the small number of grizzly bears to be released initially and the remoteness of the release sites. Closure of park or forest facilities and main roads are not expected. Given that only two trails were temporarily closed on national forest lands in the NCDE because of grizzly bears in the 10-year period from 1990 to 2000 (FWS 2016d), it is reasonable to assume that any trail and area closures would be temporary, localized, and limited.

Cumulative Effects

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on visitor use and recreational experience under alternative C are the same as those described for alternative B above. As with alternative B, benefits would be derived from the restoration of grizzly bears and the opportunity provided to visitors to see grizzly bears in their natural setting. Adverse impacts would include the potential for temporary closures lasting from a few hours to a few days requiring some visitors to adjust their stay to avoid closed areas and noise associated with helicopter operations. Overall cumulative impacts of past, present, and reasonably foreseeable actions on visitor use and experience would be beneficial because the intermittent, brief disruptions to visitor use that would be associated with certain activities (e.g., helicopter operations) would be offset by the benefits to visitor use and experience.

Overall, alternative C would contribute a small beneficial increment to the overall cumulative impacts on visitor use and experience based on the restoration of the grizzly bear to the NCE.

Conclusion

The impacts of alternative C on visitor use and recreational experience would be varied. Under alternative C, the primary phase of grizzly bear restoration would be spaced out over 5 to 10 years, with up to 100 to 136 helicopter flights into remote areas to release 25 to 34 bears (up to 9 bears additional to the intended 25 may need to be flown in to address mortality or emigration), although some additional flights may be necessary for collar retrieval and incidental actions. These flights could cause temporary disruptions of visor use and recreational experience if visitors are in the flight path or areas of releases. These impacts would be very short, lasting only minutes per occurrence. Other adverse impacts could occur if restoration activities require temporary closures; however, based on experience in other ecosystems, lengthy closures are not expected.

The time to achieve the desired restoration goal would range from 60 to 100 years. Visitor perceptions and impacts would be the similar to those described under alternative B. Overall, restoration activities under alterative C would result in potential adverse impacts for the foreseeable future as a result of the increased potential for human-grizzly bear conflicts due to the increased number of grizzly bears in the ecosystem. However, the potential for conflicts is expected to remain low given the size of the NCE and low density of the grizzly bear population. When combined with other past, present, and reasonably foreseeable future actions, cumulative impacts from alternative C are expected to be primarily beneficial, with alternative C contributing some adverse, but otherwise beneficial impacts.

Alternative D: Expedited Restoration

Under alternative D, the number of grizzly bears released each year would be subject to the same parameters as under alternative C (i.e., 5 to 7 bears per year). However, increased annual releases, monitoring, and evaluation efforts extending beyond the first 5 to 10 years would result in the target restoration goal of 200 grizzly bears to be achieved in a shorter period—roughly 25 years. As with alternatives B and C, impacts under alternative D would be beneficial or adverse depending on visitors' attitudes toward grizzly bears. Under alternative D, public education and outreach regarding safety and grizzly bear management goals would likely be similar to alternative C. As with alternative C, all visitors would be notified of ongoing grizzly bear release activities and directed to follow proper sanitation and safety protocols.

The potential for human-grizzly bear interaction would be greatest under this alternative, given the projected 25-year time horizon to achieve the restoration goal. As with the other alternatives, the intensity of adverse impacts would vary based on the visitor's location, and the frequency and timing of restoration activities. Given the expedited pace of restoration, the probability of adverse impacts on visitor use and recreational experience related to human-grizzly bear conflict is somewhat more likely to occur. Further discussion of human-grizzly bear conflict is provided in the "Public and Employee Safety" section. As discussed previously under alternatives C, trail and area closures would likely be temporary, localized, and limited. However the likelihood of a closure would be increased under this alternative given the number of bears being released (up to 168 bears).

Because alternative D would involve the release of considerably larger numbers of grizzly bears over a period of approximately 25 years, the duration of impacts would be longer than those described under alternatives B and C. For example, adverse impacts on visitor use and recreational experience associated with noise from helicopter flights associated with alternative D would be more pronounced than under alternatives B and C, given a greater number of flights. Compared to alternative C, alternative D would

require 536 additional helicopter trips (672 total flights) to release bears. This would create the potential for more chances for impacts on visitors along helicopter flight paths or near remote release sites. As with alternatives C, adverse impacts on the visual landscape associated with helicopter flights would vary based on an individual's position on the landscape and distance from ongoing restoration activities but the chances for impacts would increase. As discussed in the "Wilderness" section, impacts on opportunities for solitude and unconfined recreation associated with the release of grizzly bears would be greater than those described under alternatives B and C.

Cumulative Effects

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on visitor use and recreational experience under alternative D are the same as those described for the no-action alternative above. NPS and USFS management actions and unrelated ongoing activities would produce a combination of beneficial and adverse impacts on visitor use and recreational experience. Impacts associated with alternative D would be similar to those described for alternative C, although chances for adverse impacts from helicopter noise and other release activities could be higher based on the additional releases under this alternative. Overall cumulative impacts of past, present, and reasonably foreseeable actions on visitor use and experience would be beneficial because the intermittent, brief disruptions to visitor use that would be associated with certain activities (e.g., helicopter operations) would be offset by the benefits to visitor use and experience. Overall, alternative D would contribute a small beneficial increment to the overall cumulative impacts on visitor use and experience based on the restoration of the grizzly bear to the NCE.

Conclusion

Alternative D has the potential to produce more impacts on visitor use and recreational experience compared to the other alternatives because it would involve the release of more grizzly bears than alternatives B and C, and active capture and release operations would take place over a longer time frame. The number of grizzly bears to be released would be based on the availability of appropriate equipment and qualified personnel and the ability to capture candidate grizzly bears meeting the appropriate age and sex class requirements from donor populations. Alternative D would have more pronounced effects (during the primary phase) on visitor use and recreational experience related to management activities, noise, and the visible presence of helicopters and aircraft as well as the potential for human-grizzly encounters when compared to the other alternatives. Alternative D involves the additional releases of bears; therefore, the potential for human-grizzly bear interaction is somewhat greater within a shorter time frame compared to alternatives B and C. However, alternative D would provide lasting benefits regarding visitors' experience of nature through the reestablishment of a native species that has not had a viable population in the NCE for many years. When combined with other past, present, and reasonably foreseeable future actions, cumulative impacts from alternative D are expected to be primarily beneficial, with alternative D contributing some adverse, but otherwise beneficial impacts.

Areas outside the NCE

Although grizzly bears would be released into remote wilderness areas of the NCE, they could move outside of the recovery zone into areas adjacent to the NCE. Bears that move into suitable grizzly bear habitat would be left there if they did not pose a risk of coming into conflict with humans and livestock. As the population grows over a very long time, bears' dispersal could increase; however, it is unlikely that a meaningful proportion of the released population would leave the NCE. If grizzly bears move into recreation areas with high visitor use, managers would work to remove the bears and return them to the NCE.

In the event that the option to designate the NCE population of grizzly bears as a section 10(j) experimental population is implemented, additional management measures may become available to managers to use non-lethal measures to reduce impacts on grizzly bears that move outside NCE or to mitigate human-grizzly bear conflicts, including those associated with recreation.

PUBLIC AND EMPLOYEE SAFETY

Methods and Assumptions

The analysis of impacts on public and employee safety considers risks to the NPS, FWS, USFS, and WDFW staff, residents in and around the NCE, visitors, and the general public associated with human-grizzly bear encounters, as well as the potential employee safety risks associated with grizzly bear restoration activities proposed under each alternative. Impacts for this resource topic were analyzed qualitatively using information provided by the NPS, FWS, and USFS staff familiar with current grizzly bear management within the NCE; IGBC and WDFW guidance on the management of conflict bears; and the nature of the different types of restoration activities proposed under each alternative. The analysis also considered the types and level of visitor use taking place in areas where human-grizzly bear encounters could take place as well as impacts on residents.

Analysis Area. The area of analysis for impacts of the alternatives on public and employee safety includes the source population areas and lands within the NCE grizzly bear recovery zone, including residential areas. In addition, the analysis also assesses potential impacts that could occur if grizzly bears move outside the NCE.

Issues Analyzed. The analysis of impacts on public and employee safety under each alternative is based on the following issue statements that are identified in chapter 1:

> **Issue Statement.** The restoration of grizzly bears in the NCE has raised concerns about safety risks to backcountry recreationists, residents, and other visitors as a result of negative grizzly bear interactions.
>
> **Issue Statement.** The capture, release, and monitoring of grizzly bears could affect employee safety given the dangerous nature of the activity.

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

Under the no-action alternative, the few grizzly bears that could be using habitat in the NCE would likely remain unchanged in the short term. Without an existing viable grizzly bear population and no observed evidence of reproduction, eventual extirpation of grizzly bears in the NCE is anticipated under the no-action alternative. Prior to the permanent loss of this species in the NCE, there would be a very small possibility of public safety risk associated with human-grizzly bear encounters because only a very small number of grizzly bears have been detected in the ecosystem in the last 20 years. The potential for interactions between humans and grizzly bears would continue to be extremely low, and adverse impacts would only result in the highly unlikely event of a negative interaction. The probability of adverse impacts from human-grizzly bear encounters is expected to decrease in the long term as the grizzly bear becomes extirpated in the NCE. Tools to reduce potential conflicts, including signage, educational materials, sanitation efforts, regulations on food storage, and visitor outreach would continue to be employed and would further reduce the potential for adverse impacts from human-grizzly bear encounters.

The option to implement trail closures and access restrictions would be available as necessary in the event of a conflict between a grizzly bear and a visitor or resident. All of the actions described above would further mitigate the already highly unlikely potential for adverse impacts on public safety to a level where they generally are not expected. Over time, this alternative is not expected to result in any discernible adverse impacts on public safety.

Under the no-action alternative, adverse impacts related to injuries to employees who are conducting grizzly bear surveying activities in the backcountry are possible and could involve foot travel over difficult terrain and in very rare circumstances, transportation by helicopter. Some potential for injuries to employees could exist if there is a need to conduct aversive conditioning or otherwise manage a conflict grizzly bear; however, because of the small number of grizzly bears in the NCE, this would be considered extremely unlikely. The potential for employee accidents and injuries would be mitigated, but not completely eliminated, through proper staff training and adherence to safety protocols, including the *North Cascades National Park Service Complex Backcountry Travel Procedures* (NPS 2016h). The small number of grizzly bears present in the NCE and the expected decline in the number of grizzly bears over the long term would likely diminish efforts spent on surveying. The probability of adverse effects on employee safety related to grizzly bear management activities under the no-action alternative would be slight and would likely diminish to zero over time.

Cumulative Impacts

Activities associated with the cumulative actions were reviewed to identify potential cumulative impacts on public and employee safety in the project area. Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on public and employee safety under the no-action alternative include ongoing NPS trail maintenance and repairs, implementation of the Mountain Lakes Fishery Management Plan and associated Act, NPS fire management operations, the *Stehekin River Corridor Implementation Plan*, and NPS administrative flights. Additional ongoing and reasonably foreseeable future actions with potential safety impacts include CERCLA mine cleanup and abandoned mine land projects on USFS lands, implementation of forest plan updates, ongoing USFS trail maintenance and repairs, ongoing USFS road maintenance, and USFS wildfire suppression efforts.

NPS trail maintenance and repairs would have beneficial impacts ono public and employee safety over an indefinite time period because these actions would provide a well-maintained trail system and correct potentially unsafe trail conditions as they occur. Implementation of the Mountain Lakes Fishery Management Plan and associated Act could have adverse impacts on employee safety during implementation actions because implementation activities may involve the use of helicopters to transport NPS employees into remote areas, resulting in safety risks associated with helicopter takeoff, flight, and landing. NPS fire management activities would have beneficial impacts on public and employee safety from reduced fire risk but would have potential adverse impacts on employee safety as a result of the safety risks associated with fire management activities while these actions are occurring. NPS administrative flights for search and rescue operations would have beneficial impacts on visitor safety because of the lifesaving function that these flights serve; potential adverse impacts on employee safety could result from safety risks associated with takeoff, flight, and landing and the operation of helicopters and aircraft in adverse weather conditions. CERCLA mine cleanup and abandoned mine land projects on USFS lands would have beneficial impacts on public and employee safety through the removal of existing health and safety hazards. Forest plan updates for the Okanogan-Wenatchee and Mt. Baker-Snoqualmie National Forests would have beneficial impacts on safety because they would clarify existing policies and provide specific direction on bear and human avoidance techniques. USFS trail maintenance and repair projects would have beneficial impacts on public and employee safety by providing a well-maintained trail system and correcting potentially unsafe trail conditions as they occur. USFS road maintenance projects would have beneficial impacts on public and employee safety by providing a well-maintained

road system and correctly potentially unsafe road conditions. USFS wildfire suppression effort would have beneficial impacts on public and employee safety as a result of reduced fire risk and potential adverse impacts on employee safety from the safety risks associated with fire management activities.

Overall, cumulative actions would result in both adverse and beneficial impacts on public and employee safety; however, in aggregate these impacts would be beneficial because many of them would improve the safety of those people living and recreating in the NCE. The no-action alternative may contribute some minimal adverse impacts on employee safety as noted in the analysis above. Based on identified mitigation measures, adverse impacts on public and employee safety would be minimized to the greatest extent possible; however, although rare, some potential adverse impacts on public and employee safety would persist. As the grizzly bear population declines over time and eventually becomes extirpated, adverse impacts from potential human-grizzly bear interactions would diminish and would eventually be non-existent. As a result, when the minimal, adverse impacts of the no-action alternative are combined with the effects of other cumulative actions in the study area, an overall beneficial cumulative impact is expected. The no-action alternative would contribute a slight adverse increment on the overall beneficial cumulative impact that would decline over time.

Conclusion

Under the no-action alternative, the continuation of management activities in grizzly bear habitat would result in beneficial impacts on visitor safety as a result of safety, sanitation, and public outreach efforts and minimal, long-term, adverse impacts on employee safety as a result of the potential for employee injury during monitoring or conflict grizzly bear response activities. The likely eventual loss of grizzly bears in the NCE would eliminate the possibility of any negative human-grizzly bear interactions. Present and reasonably foreseeable future actions, as analyzed above, would contribute beneficial and adverse impacts, but in aggregate, these impacts would be beneficial. Overall, cumulative effects on public and employee safety under the no-action alternative would be beneficial. The contribution of the no-action alternative to overall beneficial cumulative impacts would be small and adverse and decrease over time.

Alternative B: Ecosystem Evaluation Restoration

Employee Safety Impacts Related to Capture, Transport, and Releases

Under alternative B, initial grizzly bear restoration activities would have potential adverse impacts on the safety of agency employees and contractors because of the activities involved in capture, transport, and release of grizzly bears in the first 2 years of implementation. Depending on the outcome of monitoring, managers could decide to repeat the initial release and continue monitoring or transition to alternative C. If managers decide to move toward implementation of alternative C during the adaptive management phase of this alternative, the impacts would coincide with those described for alternative C, below.

Agency staff, including Canadian counterparts, would seek to locate areas with high grizzly bear densities in the NCDE and part of British Columbia, Canada, to maximize their potential for capturing bears that fit the demographic criteria. These activities would result of in risks to staff safety. However, through implementation of required safety measures, the likelihood of risks to safety would be minimal.

During capture activities, grizzly bears would be sedated, further minimizing impacts on employee safety. During transport, sedation would be allowed to wear off to allow grizzly bears the opportunity to recover from anesthesia before they are released. Based on the initial sedation and adherence to applicable safety protocols and precautions, impacts on employee and contractor safety during capture and release would be minimized.

Helicopter flight operations associated with capture and transport of grizzly bears and takeoff and landing operations, which could take place in potentially difficult backcountry terrain, would pose a risk to the safety of employees and contractors involved in grizzly bear capture and release operations. Pilots and personnel who participate in helicopter capture and release operations would be properly licensed and trained and use all required safety equipment and precautions. Release sites would be reviewed for safety concerns prior to use. Flights would take place only during favorable weather to avoid potentially dangerous flight conditions. Helicopter operations in the NCE are not uncommon. As discussed under the "Wilderness" section of chapter 3, flight hours over wilderness average approximately 142 hours per year. The majority of flight operations stem from active fire management operations. Approximately 10 capture and release operations, with up to 4 helicopter trips per operation, for a total of 40 helicopter round trips would take place over approximately 2 years, which would limit the number of opportunities for adverse impacts to occur. In the event of an accident involving the operation of a helicopter that leads to human injury or loss of life, adverse impacts on employee safety could be catastrophic for the individual employee or employees involved; however, with the extensive safety precautions that would be in place, the potential for adverse impacts on employee safety from helicopter operations during the primary phase would be minimized.

Release of grizzly bears from culvert traps would involve using a remote controlled door-release that could be operated from a helicopter or by ground personnel located a safe distance away to minimize potential adverse safety impacts on employees (Ransom pers. comm. 2016). In the event of a conflict between an employee and a grizzly bear during capture or release that leads to human injury or loss of life, adverse impacts on employee safety could be substantial; however, with the extensive safety precautions that would be in place, the potential for adverse impacts on employee safety from handling of grizzly bears during capture and release during the initial years of restoration would be minimized.

Under alternative B, monitoring grizzly bears through satellite tracking is not anticipated to result in any adverse impacts on employee safety. The occasional use of fixed-wing aircraft for aerial monitoring could result in some slight potential for adverse impacts on employee safety. However, when flights for aerial monitoring occur, all personnel and activities would follow safety standards set forth by the U.S. Department of the Interior's Office of Aviation Services and other applicable safety protocols, and all pilots and operators would be properly trained, minimizing any potential impacts.

Impacts on employee safety under alternative B could also result from hazing, relocation, or removal of conflict grizzly bears. These activities would involve many of the same components as capture and release activities, including using helicopters to transport NPS and FWS employees, placing traps, and relocating grizzly bears, and would therefore have the same potential adverse impacts on employee safety that the release of grizzly bears would have. The potential for these adverse impacts on employee safety to occur would be limited and infrequent because the need for these types of conflict grizzly bear management activities is expected to be limited and infrequent. Adverse impacts could be substantial if a helicopter-related incident or a grizzly bear conflict results in injury or loss of life; however, with the extensive safety precautions that would be in place, the potential for adverse impacts on employee safety would be minimized.

Public Safety Impacts Associated with Restoration Activities

Staging Area Impacts. Under alternative B, the staging area used for initiating grizzly bear restoration activities would be closed to the public; therefore, impacts on public safety, including the safety of visitors and residents, would be avoided.

Grizzly Bear Release Impacts. Under alternative B, adverse impacts on public safety could occur during release activities. However, the potential for public safety impacts would be minimal given the small

number of grizzly bears to be released at a single, remote release site. Subsequent releases would not take place until at least two seasons of monitoring have passed. When a decision is made related to additional releases, either the primary restoration phase would be repeated, or managers would transition to implementing alternative C, which would result in different impacts as described for alternative C below. The potential for initial adverse impacts on visitor safety related to the presence of grizzly bears in the ecosystem and the associated risk of human-grizzly bear encounters would be highly localized under alternative B and would be limited for the first several years to the general proximity of the one remote site within designated wilderness in the northern portion of the NCE. Given the very small number of grizzly bears that would be present on the landscape during the first several years of initial restoration activities, it is highly unlikely that visitors would encounter a grizzly bear and extremely unlikely that a conflict would ensue. Monitoring of the 10 grizzly bears that are initially released would inform managers about grizzly bear movement and habitat use relative to areas of the NCE that experience heavy human use.

Under alternative B, there could be some adverse impacts on residents who reside in or in close proximity to the NCE; however, the exact location and potential future movement patterns of grizzly bears released into the NCE are difficult to predict. Therefore, impacts on specific communities cannot be determined. However, Concrete, Darrington, Marblemount, and Mazama are located closer to the potential release site than other communities. Therefore, if any impact were to occur, it would be more probable that any impacts would first occur in these communities. Communities located farther from the release site would be less likely to be affected, especially those located communities outside the NCE. However, the likelihood that any safety conflict would occur as a result of human-grizzly bear interaction would be very low in the primary phase because only up to 10 grizzly bears would be released into the NCE. In the GYE, which had an estimated 757 grizzly bears in 2014, 11 incidences of conflict grizzly bears occurred around developed sites such as housing with only 3 incidences of human injury (IGBC 2014). Additionally, one of the key characteristics of grizzly bears captured for restoration purposes is that the grizzly bears have no history of conflict with humans and no history of positive attraction to humans, human-use areas, or human-related foods (Kasworm et al. 2011; MacHutchon and Austin 2004). These selection criteria should further reduce any expected interaction between grizzly bears and local communities. Overall, the potential for adverse impacts on communities would be very small in the primary phase because of the small number of bears released into the NCE and the continued use of preventative grizzly bears-human interaction measures described above.

Current management actions, such as providing food lockers and grizzly bear-resistant waste receptacles and visitor education on backcountry food preparation and storage, contribute to maintaining the safety of both grizzly bear and human populations. These proactive measures are intended to prevent adverse interactions between human populations and grizzly bears. Ongoing community education regarding the removal or management of attractants, similar to that currently provided by the WDFW and a small number of non-governmental organizations would also be essential. Another proactive measures includes the establishment of electric fencing around community or home gardens, which are effective in preventing damage to these facilities (Gunther et al. 2004).

Grizzly Bear Restoration Impacts. Under alternative B, the population of grizzly bears and the probability of human-grizzly bear encounters are anticipated to remain very low for several decades following initial restoration activities because of the low density of the population of grizzly bears released in the area. As an example, in the CYE and Selkirk Ecosystem (SE), where there are low-density recovering populations of grizzly bears (45–50 and 70–80, respectively), only one human injury caused by a grizzly bear has been recorded in the last 36 years (Kasworm pers. comm. 2016a). Given these statistics, it is reasonable to assume that the smaller sized grizzly bear population projected in the NCE under alternative B (10 bears within the first 5 years) would present even less potential risk to public safety. Grizzly bear awareness and safety education, sanitation measures, backcountry/wilderness use

permitting requirements, and other grizzly bear safety measures described in chapter 2 and under the no-action alternative above are expected to mitigate safety risks under alternative B. Grizzly bears released into the NCE would be monitored for habitat use, mortality, and incidences of human conflict. Increased outreach efforts, including public notification of the potential presence of a grizzly bear within a general geographic area, are expected to provide further mitigation by increasing visitor and resident awareness and allowing visitors and residents the option of avoiding an area where a grizzly bear may be present. In addition, all applicable NPS and USFS policies and state laws (see appendix C) regarding proper food storage would be adhered to as noted in the no-action alternative. In the event of a human-grizzly bear conflict, the 2002 IGBC guidelines for the NCE would be implemented to quickly resolve the source of conflict (see appendix E). Management of all conflict grizzly bear situations would first emphasize removal of the human cause of the conflict (such as a food source) when possible, and management and education actions would be implemented to prevent future conflicts. Temporary area closures required to manage the human-grizzly bear conflict may be implemented lasting from several hours to several days. Aversive conditioning measures would be implemented to deter grizzly bears that may become habituated to human presence and/or food conditioned. Grizzly bears may be preemptively moved if they are in areas where they are likely to come into conflict with humans and human-related attractants that cannot be secured at a quick enough pace to prevent grizzly bears from becoming food conditioned. Grizzly bears displaying unacceptable aggression or a conflict resulting in a serious human injury or fatality would be removed from the population upon first incidence of such a conflict.

In the event of a conflict between a visitor and a grizzly bear resulting in human injury or fatality, adverse impacts on public safety would be substantial. However, given the small number of grizzly bears that would be present on the landscape in the primary phase, their limited distribution, and the proactive measures and conflict grizzly bear response actions discussed above, the probability of such impacts occurring is considered minimal. The probability that a visitor would encounter a grizzly bear would remain low, with the probability of conflict or human injury being further reduced. As a point of comparison, from 1980 to 2014, close to 100 million people visited Yellowstone National Park, which is the core of the GYE grizzly bear recovery zone and makes up approximately 37% of its land area. During the same 34-year period, 45 people were injured by grizzly bears in the park, which contained a peak population of 757 bears in 2014. Out of the 45 total injuries, 33 were in the backcountry (NPS 2016i). The vast majority of injuries were attributable to defensive aggression by grizzly bears during surprise encounters with hikers. For all visitors to Yellowstone National Park combined, the chances of being injured by a grizzly bear are approximately 1 in 2.7 million (table 10) (Gunther 2015). During the 144-year history of Yellowstone National Park, seven people have been killed by grizzly bears in the park, and one additional person was killed by a bear whose taxonomy was not specified (i.e., the animal was not specifically identified as a grizzly bear). During that same time frame at Yellowstone National Park, 119 people have died from drowning, 36 from falling, 24 from suicide, 20 from thermal burns from falling into thermal pools, 19 in horse related accidents, 10 from freezing, and 9 from murder, highlighting the rarity of deaths from grizzly bear attacks at Yellowstone National Park (Gunther 2015).

For relative comparison purposes, Yellowstone National Park received more than 4 million visitors in 2015, while the park complex received 823,000 visitors during the same period, a number of whom remained within the state highway 20 corridor. However, only approximately 21,000 visitors used backcountry areas. Given this level of visitation and the lower population density of grizzly bears, potential injuries and fatalities within the NCE are expected to be far lower than those presented for Yellowstone National Park, all resulting in a decreased potential for grizzly bear and visitor interactions.

TABLE 10. TYPE OF RECREATION ACTIVITY AND RISK OF GRIZZLY BEAR ATTACK IN YELLOWSTONE NATIONAL PARK

Type of Recreational Activity	Risk of Grizzly Bear Attack
Remain in developments, roadsides, and boardwalks	1 in 25.1 million visits
Camp in roadside campground:	1 in 22.8 million overnight stays
Multi-day backcountry trips:	1 in 200 thousand overnight stays
All park activities combined	1 in 2.7 million visits

Source: Gunther 2015.

In front country areas or portions of the NCE that are distant from release areas (such as the southernmost portion of the NCE located between U.S. Highway 2 and Interstate 90), the probability of adverse impacts on public safety related to the release of grizzly bears in the NCE under alternative B is expected to be near zero.

As grizzly bears increase in number over time and begin to use habitat over a larger area of the ecosystem, the potential for humans to encounter grizzly bears would exist over a greater geographical range. It should be noted that only a very small fraction of grizzly bear-human interactions are negative; most involve the avoidance of people by the bear(s).

In the adaptive management phase, coordinated interagency efforts to promote grizzly bear awareness through education and outreach would be intensified, sanitation measures would continue to be implemented, and backcountry/wilderness use permitting requirements would continue to enforce safety precautions. The 2002 IGBC guidelines for the NCE would continue to govern the implementation of human-grizzly bear conflict avoidance/mitigation measures and the management, relocation, or removal of conflict grizzly bears, as described above.

Cumulative Impacts

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on public and employee safety under alternative B are the same as those described for the no-action alternative. Cumulative actions would result in both adverse and beneficial impacts on public and employee safety, but in aggregate the impacts would be beneficial as agencies work to improve conditions in the NCE. Alternative B would contribute adverse impacts on public and employee safety in terms of conflicts with grizzly bears and risks associated with initiating restoration actions; however, the probability of adverse impacts occurring would be low, as detailed above. As a result, when the primarily minimal adverse impacts of the alternative B are combined with the effects of other cumulative actions in the study area, an overall beneficial cumulative impact is expected, with alternative B contributing a slight adverse increment. If a decision is made to transition to alternative C, these adverse impacts would likely increase as grizzly bears are restored.

Conclusion

Alternative B would result in adverse impacts on employee safety during restoration activities, related to helicopter operations and capture and release activities associated with grizzly bears. The probability of these adverse impacts occurring would diminish over time as initial restoration efforts that release multiple grizzly bears into the NCE each season give way to more intermittent additional releases as necessary during the adaptive management phase. Proper employee training, licensing, and adherence to safety precautions and protocols would mitigate and reduce the probability of adverse impacts on employee safety. Periodic hazing, relocation, or removal of conflict grizzly bears would also result in adverse impacts on employee safety that would be similar to those described for release of grizzly bears.

Under alternative B, management activities in grizzly bear habitat would result in adverse impacts on public safety over an indefinite time frame because of the increased potential for human-grizzly bear conflicts associated with the increased number of grizzly bears in the ecosystem. The potential for conflicts to occur is nonetheless expected to remain very low because the number and population density of grizzly bears on the landscape would remain low enough to limit the probability that visitors or residents would encounter grizzly bears. Information from grizzly bear monitoring would be used both to inform outreach to visitors and residents and to proactively mitigate human-grizzly bear conflicts. The implementation of safety, sanitation, and public outreach efforts and conflict grizzly bear management would further mitigate the potential for adverse impacts resulting from human-grizzly bear conflicts. Present and reasonably foreseeable future actions would contribute both beneficial and adverse impacts. Overall, cumulative effects on public and employee safety under alternative B would be and beneficial with alternative B contributing a slight adverse increment.

Alternative C: Incremental Restoration

Employee Safety Impacts Related to Capture, Transport, and Releases

Initial grizzly bear restoration activities would have potential adverse impacts on the safety of agency employees, including Canadian counterparts and contractors, from the activities involved in the capture, transport, and release of grizzly bears during the primary phase.

The type of impacts related to the capture of grizzly bears would be the same as those described for alternative B, although the probability for impacts would be slightly higher given the additional number of bears that would be captured during the primary phase of restoration—25 bears (likely 34 total to compensate for grizzly bear mortality or emigration). As described for alternative B, grizzly bears would be sedated during capture and allowed to recover from anesthesia before they are released. The combination of the initial sedation and adherence to applicable safety protocol and precautions would diminish impacts on employee safety. Helicopter flight operations associated with capture and transport of grizzly bears and takeoff and landing operations, which could take place in potentially difficult backcountry terrain, would pose a similar safety risks to employees and contractors as described under alternative B. However, when compared to alternative B, alternative C would require up to 96 additional trips (100 to 136 total) to support transport and release efforts, thus incrementally increasing the potential risk for impacts. Pilots and personnel who participate in helicopter capture and release operations would be properly licensed and trained and would use all required safety equipment and precautions. Flights would take place only during favorable weather to avoid potentially dangerous flight conditions. Capture and release operations are expected to occur over 5 to 10 years. In the event of an accident involving the operation of a helicopter that leads to human injury or loss of life, adverse impacts on employee safety could be substantial; however, with the extensive safety precautions that would be in place, the potential for primary phase adverse impacts on employee safety from helicopter operations would be minimized.

In the adaptive management phase, agency employee actions under alternative C would largely consist of monitoring grizzly bears through satellite tracking, which is not anticipated to result in any adverse impacts on employee safety. As noted under alternative B, the occasional use of fixed-wing aircraft for aerial monitoring could result in some slight potential for adverse impacts on employee safety. When flights for aerial monitoring occur, all personnel and activities would follow safety standards set forth by the U.S. Department of the Interior's Office of Aviation Services and other applicable safety protocols and all pilots and operators would be properly trained, minimizing any potential impacts. Adaptive management activities are likely to involve the periodic release of additional grizzly bears into the NCE to replace grizzly bears that have been lost to mortality, have emigrated out of the NCE, or have been relocated or removed as a result of conflicts with humans. Additional grizzly bears may also be released as necessary to influence genetic and demographic diversity. These additional release activities would be

undertaken in the same way as initial capture and release activities; therefore, they would have the same potential impacts related to the operation of helicopters and the capture, handling, transport, and release of grizzly bears as described above. Similar to the initial phase of restoration, impacts on employee safety during the adaptive management phase could be adverse, but the opportunities for such impacts to occur would be limited and infrequent because of the intermittent nature of additional release activities. Adverse impacts could be substantial if a helicopter-related incident or a grizzly bear conflict results in human injury or loss of life; however, with the extensive safety precautions that would be in place, the potential for adverse impacts on employee safety from additional releases of grizzly bears during the adaptive management phase would be minimized.

Impacts on employee safety under alternative C during the adaptive management phase could also result from hazing, relocation, or removal of conflict grizzly bears. These activities could involve many of the same components as capture and release activities, including using helicopters to transport agency employees, placing traps, and relocating grizzly bears; therefore, they would have the same potential adverse impacts on employee safety associated with the release of grizzly bears. The potential for these adaptive management phase adverse impacts on employee safety to occur would be limited and infrequent because the need for these types of conflict grizzly bear management activities is expected to be limited and infrequent. Adverse impacts could be substantial if a helicopter-related incident or a grizzly bear conflict results in injury or loss of life; however, with the extensive safety precautions that would be in place, the potential for impacts on employee safety during the adaptive management phase would be minimized.

Public Safety Impacts Associated with Restoration Activities

Staging Areas Impacts. Under alternative C, similar to alternative B, staging areas used for grizzly bear restoration activities would be temporarily closed to the public; therefore, impacts on visitor safety would be avoided.

Grizzly Bear Release Impacts. Under alternative C, there would be potential adverse impacts on public safety in both the primary phase and adaptive management phase. These impacts would be similar to those described above for alternative B, with the probability of impacts occurring during the initial onset being potentially slightly higher under alternative C than alternative B as a result of the increased number of grizzly bears in the initial release. In the primary phase, the potential for public safety impacts related to active grizzly bear release operations would be minimized because release sites would be chosen in locations that are remote from high human-use areas. The potential for primary phase adverse impacts on public safety related to the presence of grizzly bears in the ecosystem and the associated risk of human-grizzly bear encounters would be highly localized and limited to the general proximity of the two to three remote sites within designated wilderness in the northern portion of the NCE. General grizzly bear awareness education, sanitation measures, backcountry/wilderness use permitting requirements, and other grizzly bear safety measures already in place on federal lands in the NCE as described in chapter 2 and under the no-action alternative are expected to mitigate public safety risks. Grizzly bears released into the NCE would be monitored for habitat use, reproduction, mortality, and incidence of conflict. Increased outreach efforts, including public notification of the potential presence of a grizzly bear within a general geographic area, are expected to provide further mitigation by increasing public awareness and allowing people the option of avoiding an area where a grizzly bear may be present. A few bears (one to two at any one time as determined necessary) could be added every few years during the adaptive management phase, potentially resulting in additional public safety impacts.

Grizzly Bear Restoration Impacts. As noted under alternative B during the first several decades following initial restoration, the chance of human injury caused by grizzly bears would be exceedingly small because of the low density of the grizzly bear population and the relatively few members of the

public present in the area. In the event of a human-grizzly bear conflict, existing 2002 IGBC guidelines for the NCE would be quickly implemented to resolve the source of conflict (see appendix E). Management of all conflict grizzly bear situations would proceed in an identical fashion as described under alternative B. In the event of a conflict between a visitor or resident and a grizzly bear that results in human injury or fatality, adverse impacts on public safety would be substantial; however, given the small number of grizzly bears that would be present on the landscape in the primary phase, their limited distribution, and the mitigation measures and conflict grizzly bear response actions discussed above, the probability of such impacts in the primary phase would be minimal. As noted under alternative B, in front country areas or portions of the NCE that are distant from release areas, the probability of adverse impacts on visitor safety associated with release efforts during the primary phase are expected to be near zero.

Under alternative C, the presence of an increased number of grizzly bears in the NCE has the potential to result in adverse impacts on public safety related to human-grizzly bear conflicts in the adaptive management phase and beyond. In addition, as grizzly bears increase in number over time and begin to use habitat over a larger area of the ecosystem, the potential for humans to encounter grizzly bears would exist over a greater geographical range. Under alternative C, the NCE grizzly bear population is anticipated to achieve the initial restoration goal of 25 grizzly bears in the course of roughly 5 to 10 years and a further restoration goal of approximately 200 grizzly bears in approximately 60 to 100 years. The probability that not only a visitor or resident would encounter a grizzly bear, but that there could be a human injury, would nonetheless be expected to remain low, as illustrated by the examples provided under the analysis of alternative B.

Under the adaptive management phase, as more grizzly bears could potentially be introduced into the NCE, and as the population of grizzly bears grows, the likelihood of more human-grizzly bear interactions would increase. Any adverse impacts would likely occur first in areas with agriculture, apiaries, livestock operations, or human housing because these areas could be attractants to grizzly bears. Communities with multiple unsecured attractants located in close proximity to one another would be likely to experience higher impacts than areas with only one of these attractants (Wilson et al. 2006). Additionally, these interactions are likely to increase during seasons when the availability of natural food for grizzly bears is low (Gunther et al. 2004). However, some residents located in suitable grizzly bear habitat outside the NCE could experience additional long-term impacts as bears move into these habitats over the next 60 to 100 years.

Coordinated interagency efforts to promote grizzly bear awareness through education and outreach would be intensified; sanitation measures would continue to be implemented; and backcountry/wilderness use permitting requirements would continue to enforce safety precautions. The 2002 IGBC guidelines for the NCE would continue to govern the implementation of human-grizzly bear conflict avoidance/mitigation measures and the management, relocation, or removal of conflict grizzly bears, as described above.

Similar to primary phase impacts, impacts on public safety in the adaptive management phase under alternative C would be primarily attributable to the potential for human-grizzly bear conflicts. In the event of a conflict between a visitor or resident and a grizzly bear that results in human injury or fatality, adverse impacts on visitor safety would be substantial; however, given the low probability of a conflict, and the implementation of the safety, sanitation, and conflict avoidance/mitigation measures described above, many of which are already implemented in the NCE, the probability of adverse impacts on public safety is expected to be minimal.

Cumulative Impacts

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on public and employee safety under alternative C are the same as those described under the no-action

alternative. Cumulative actions would result in both adverse and beneficial impacts on public and employee safety. Alternative C would contribute adverse impacts on public and employee safety in terms of potential conflicts with grizzly bears and risks associated with implementing restoration actions during the primary and adaptive management phase and into the future; however, the probability of adverse impacts occurring would be low, as detailed above. As a result, when the minimal adverse impacts of the alternative C are combined with the effects of other cumulative actions, an overall beneficial cumulative impact is expected, with alternative C contributing a slight adverse increment to the overall beneficial cumulative impact.

Conclusion

Alternative C could result in adverse impacts on employee safety related to helicopter operations and capture and release activities associated with grizzly bear restoration. The probability of these adverse impacts occurring would diminish in the long term as initial restoration efforts that release multiple grizzly bears into the NCE each season give way to more intermittent additional releases as necessary. Proper employee training, licensing, and adherence to safety precautions and protocols would mitigate and reduce the probability of such adverse impacts on employee safety. Any necessary hazing, relocation, or removal of conflict grizzly bears would also result in adverse impacts on employee safety similar to those described for release of grizzly bears. Under alternative C, restoration activities in grizzly bear habitat would result in long-term, adverse impacts on visitor safety in the primary and adaptive management phases and into the future as a result of the slightly increased potential for human-grizzly bear conflicts from the increased number of grizzly bears in the ecosystem. The potential for conflicts to occur would nonetheless be expected to remain relatively low because the number and population density of grizzly bears on the landscape would remain low enough to limit the probability that visitors would encounter grizzly bears. Impacts on residents would be low in the primary phase and higher in years with lower food availability; however, the likelihood of impacts under this alternative would be greater in the long term because of the larger population of grizzly bears in the adaptive management phase. The implementation of interagency safety, sanitation, and public outreach efforts and 2002 IGBC guidance for conflict grizzly bear management would further mitigate the potential for adverse impacts resulting from human-grizzly bear conflicts. Present and reasonably foreseeable future actions, as analyzed above, would contribute beneficial and adverse impacts, but in aggregate, these impacts would be beneficial. Overall, cumulative effects on public and employee safety under alternative C would be long term and beneficial with alternative C contributing a slight adverse increment to the overall beneficial cumulative impact.

Alternative D: Expedited Restoration

Under alternative D, grizzly bear restoration activities would have potential adverse impacts that could be more substantial than those described for alternatives B and C because grizzly bear restoration activities would be carried out continuously each summer/fall until the restoration goal of approximately 200 grizzly bears in the ecosystem is reached. It is thus possible that active restoration activities could be ongoing for approximately 25 years to reach this goal.

Employee Safety Impacts Related to Capture, Transport, and Releases

Similar to alternatives B and C, adverse impacts on the safety of agency employees and contractors would result from the activities involved in the capture, transport, and release of grizzly bears. However, the risk of impacts would be higher because almost five times as many bears would need to be captured and handled compared to alternative C. All applicable safety measures described for alternatives B and C would be implemented to minimize potential risks.

Capture of grizzly bears in source areas, similar to other action alternatives, would use free-range darting, foot snares, and culvert traps and could place employees and contractors in situations where they would be in close contact with defensive grizzly bears. During capture grizzly bears would be sedated, but they would be allowed to recover from anesthesia before they are released. Release of grizzly bears would be undertaken in the same way as described under alternative B—a remote-controlled door release would be used to minimize potential safety impacts on employees. Alternative D would result in a far greater number of capture operations in the short term than alternatives B and C. This would provide a greater number of opportunities for employee injury during capture operations in the primary phase. In the event of a conflict between an employee and a grizzly bear during that leads to human injury or loss of life, adverse impacts on employee safety would be substantial; however, because of the extensive safety precautions that would be in place, the potential for adverse impacts on employee safety from handling of grizzly bears during capture and release would be minimized to the greatest possible extent.

Under alternative D, impacts associated with activities at staging areas would be similar to those described under alternative C, except the duration of risk to employee safety would be longer and the number of opportunities for impacts on employee safety to occur would be greater because of the longer duration and greater intensity of grizzly bear restoration activities. Agency employees and contractors involved in the transport and release of grizzly bears would be operating various types of vehicles and equipment at the staging areas, including helicopters, and also handling live animals. All of these activities would generate some potential for employee injury; however, it is expected that all personnel involved in activities at staging areas would have the proper experience and training necessary to minimize the probability that an injury would occur. Appropriate protective equipment would be required, and personnel trained in first aid would be present on location. Overall, activities at staging areas under alternative D could result in adverse impacts on employee safety; however, the probability of such adverse impacts would be low.

In the primary phase, helicopter flight operations associated with capture of grizzly bears, as well as takeoff and landing operations, which could take place in potentially difficult backcountry terrain, would pose a safety risk to employees or contractors involved in grizzly bear capture operations. Likewise, helicopter takeoff, flight, and landing during grizzly bear release operations would present similar employee safety risks. These impacts would be similar to alternative C, except alternative D would require 672 flights, or 536 additional helicopter trips to release bears. Pilots and personnel who participate in helicopter capture and release operations would be properly licensed and trained and use all required safety equipment and precautions. Flights would take place only during favorable weather, to avoid potentially dangerous flight conditions. In the event of an accident involving the operation of a helicopter that leads to human injury or loss of life, adverse impacts on employee safety could be substantial; however, the extensive safety precautions that would be in place are expected to minimize the potential for primary phase adverse impacts on employee safety to the greatest possible extent.

Potential impacts on employee safety under alternative D could result from hazing, relocation, or removal of conflict grizzly bears. These activities would involve many of the same components as capture and release activities, such as the potential use of helicopters to transport NPS and FWS employees, place traps, and relocate grizzly bears, and would therefore have the same potential adverse impacts on employee safety that the capture and release of grizzly bears would have. The potential for these adverse impacts on employee safety to occur would be limited and infrequent because the need for these types of conflict grizzly bear management activities is expected to be low. Adverse impacts could be substantial if a helicopter-related incident or a grizzly bear conflict results in injury or loss of life; however, with the extensive safety precautions that would be in place, the potential for long-term adverse impacts on employee safety would be minimized. These activities would mitigate potential indefinite, long-term, adverse impacts on a point where they would be unexpected and uncommon, as they would deter or remove a conflict grizzly bear and thereby remove a public and employee safety threat.

Public Safety Impacts Associated with Restoration Activities

Staging Area Impacts. Staging areas used for grizzly bear restoration activities would be temporarily closed to the public; therefore, impacts on visitor safety would be avoided.

Grizzly Bear Release Impacts. Relative to alternatives B and C, alternative D would result in an increased probability of human-grizzly bear encounters within the first several decades of restoration because grizzly bears would be released continuously until the full restoration goal of 200 grizzly bears is achieved. Alternative D would result in a higher number of grizzly bears present in the ecosystem within the primary phase than alternatives B or C, and the restoration goal would be reached within a shorter time frame. The potential for adverse impacts from conflicts between humans and grizzly bears would still be low, as illustrated in the examples from other grizzly bear ecosystems that are discussed under alternative B. All of the public outreach, sanitation, and conflict grizzly bear response measures discussed under alternatives B and C would also be implemented under alternative D, and these actions are expected to minimize the potential for adverse impacts. In the event of a conflict between the public and a grizzly bear resulting in human injury or fatality, adverse impacts on individuals would be substantial. While the probability of a conflict in the short term under alternative D may be greater than under alternatives B and C, it would nonetheless still be considered very low, given the number of bears released and number of potential visitors. Furthermore, the implementation of the safety, sanitation, and conflict avoidance/mitigation measures and conflict grizzly bear response measures described under the no-action alternative and alternatives B and C are expected to minimize the probability of substantial adverse impacts on visitor safety.

Grizzly Bear Restoration Impacts. The potential for indefinite, long-term, adverse impacts on public safety related to human-grizzly bear conflicts would be similar to alternative C because all three alternatives are expected to result in a grizzly bear population of similar size over the long term. Coordinated interagency efforts to promote grizzly bear awareness would continue, sanitation measures would continue to be implemented, and backcountry/wilderness use permitting requirements would continue to enforce safety precautions. The 2002 IGBC guidelines for the NCE would continue to govern the implementation of human-grizzly bear conflict avoidance/mitigation measures and the management, relocation, or removal of conflict grizzly bears, as described above. Indefinite, long-term, adverse impacts on visitor safety under alternative D would be primarily attributable to human-grizzly bear conflicts. In the event of a conflict between a visitor and a grizzly bear resulting in human injury or fatality, adverse impacts on visitor safety would be substantial; however, the implementation of the safety, sanitation, and conflict avoidance/mitigation measures described above, most of which are already implemented in the NCE, are expected to minimize the probability of a conflict occurring.

Cumulative Impacts

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on public and employee safety under alternative D are the same as those described for alternative B above. Cumulative actions would result in both adverse and beneficial impacts on public and employee safety, but in aggregate these impacts would be beneficial as agencies work to improve conditions in the NCE. Alternative D would contribute primary phase and additional longer-term adverse impacts on public and employee safety in terms of conflicts with grizzly bears and risks associated with implementing restoration actions; however, the probability of adverse impacts occurring would be minimized to the greatest extent possible, as detailed above. As a result, when the primarily minimal adverse impacts of the alternative D are combined with the effects of other cumulative actions in the study area, an overall beneficial cumulative impact is expected with alternative D contributing a slight adverse increment to the overall beneficial cumulative impact.

Conclusion

Alternative D could result in adverse impacts on employee safety related to helicopter operations and capture and release activities associated with grizzly bear restoration. The probability of these adverse impacts occurring would diminish in the adaptive management phase and beyond and would be limited to relocation and removal of conflict grizzly bears because additional releases would not be carried out once the restoration goal of 200 grizzly bears is achieved. Proper employee training, licensing, and adherence to safety precautions and protocols would mitigate and reduce the probability of adverse impacts on employee safety to the greatest extent possible. Under alternative D, restoration activities in grizzly bear habitat could result in adverse impacts on visitor safety in both the primary phase and adaptive management phase and into the future because of the increased potential for human-grizzly bear conflicts from the increased number of grizzly bears in the ecosystem. The potential for conflicts to occur would be greater in the primary phase of alternative D than under the primary phases of alternatives B and C because of the greater intensity of initial restoration efforts and the shorter time frame for achieving the restoration goal of 200 grizzly bears. Monitoring; the implementation of interagency safety, sanitation, and public outreach efforts; and implementation of IGBC guidance for conflict grizzly bear management would mitigate the potential for adverse impacts resulting from human-grizzly bear conflicts. Impacts on residents could be greater in the primary phase of alternative D than under alternative C because of the increased number of grizzly bears being released. Present and reasonably foreseeable future actions, as analyzed above, would contribute beneficial and adverse impacts, but in aggregate, impacts would be beneficial. Overall, cumulative effects on public and employee safety under alternative D would be beneficial, with alternative D contributing a slight adverse increment to the overall beneficial cumulative impact.

Areas outside the NCE

Although grizzly bears would be released into remote wilderness areas of the NCE, they could move outside of the area into other parts of Washington adjacent to the NCE. Bears that move into suitable grizzly bear habitat would be left there if they did not pose a risk of coming into conflict with humans and livestock. As the population grows, bears movement could increase; however, it is unlikely that a meaningful proportion of the released population would leave the NCE. If grizzly bears move into residential areas or areas with concentration of people, managers would work to remove bears and return them to the NCE, if possible. In the event grizzly bears become conditioned to humans, they would be removed. Recapturing activities would increase the risks to employee safety.

In the event that the option to designate the NCE population of grizzly bears as a section 10(j) experimental population is implemented, additional management measures may become available to managers to use non-lethal measures to reduce impacts on grizzly bears that move outside NCE or to mitigate human-grizzly bear conflicts, including those associated with public safety.

SOCIOECONOMICS

The CEQ regulations implementing NEPA state that when economic or social effects and natural or physical environmental effects are interrelated, the EIS discusses these effects on the human environment (40 CFR 1508.14). The CEQ regulations further state that the “human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment.” This socioeconomic analysis evaluates how the action alternatives could affect elements of the human environment such as employment, tourism, agriculture, cattle grazing, timber harvesting, and mining.

Methods and Assumptions

The analysis of socioeconomic impacts considers potential effects on employment, population, and revenue from natural resource-related activities and revenue from park and national forest visitation that may result from grizzly bear restoration under each alternative. Impacts for this resource topic were analyzed using information on population, employment, and key regional industry sectors provided by the U.S. Census Bureau; information on the economic contribution of national park visitation in the NCE provided by the NPS; and information on timber sales and grazing leases provided by the USFS. A qualitative analysis was performed by subject matter experts based on professional judgment supported by the information described above.

Analysis Area. The area of analysis for socioeconomic impacts resulting from the alternatives includes the seven counties that, in whole or in part, make up the NCE grizzly bear recovery zone. The seven-county region of influence (ROI) includes Chelan, King, Kittitas, Okanogan, Skagit, Snohomish, and Whatcom counties. The area occupied by the NCE grizzly bear recovery zone comprises approximately 52% of the total land area of the ROI. The area of analysis for socioeconomic impacts is expanded beyond the boundaries of the NCE grizzly bear recovery zone because the population and employment centers that could potentially experience socioeconomic impacts as a result of grizzly bear restoration are, in many instances, located outside of the recovery zone. Where appropriate, specific communities or industries located closer to the NCE may be discussed in detail if more acute impacts on these communities or industries are expected as a result of potential future grizzly bear movement outside the NCE.

Issues Analyzed. The analysis of impacts on socioeconomics under each alternative is based on the following issue statements that are identified in chapter 1:

> **Issue Statement.** The restoration of grizzly bears in the NCE has raised concerns about economic impacts on natural resource-based industries such as mining and logging. Concerns have been raised about potential for depredation of livestock or agriculture such as fruit orchards.
>
> **Issue Statement.** Revenue may be impacted as a result of changes in tourism and hunting revenue resulting from grizzly bear restoration.

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

Under alternative A, no grizzly bears would be released into the NCE. No emigration of grizzly bears into the NCE is expected, and a self-sustaining population of grizzly bears within the NCE is not expected under this alternative. Current management conditions within the NCE would continue.

Communities. Under alternative A, no impacts on population or communities identified in the socioeconomics baseline described in chapter 3 are anticipated because grizzly bears would not be released into the NCE, and the NCE would be managed using current management practices.

Employment. No impacts on employment related to tourism, agriculture, cattle grazing, timber harvesting, mining, wildlife managers, or park managers are anticipated under this alternative.

Tourism, Agriculture, Cattle Grazing, Timber Harvest, and Mining. Tourism, agriculture, cattle grazing, timber harvesting, and mining leases are not anticipated to be affected under alternative A because grizzly bears would not be released into the U.S. portion of the NCE.

Cumulative Effects

Because socioeconomics would not be affected under this alternative, cumulative impacts would not occur.

Conclusion

Under the no-action alternative, no impacts on socioeconomics would occur because grizzly bears would not be restored in the NCE.

Alternative B: Ecosystem Evaluation Restoration

Under alternative B, up to 10 grizzly bears would be released over the first 2 years of primary restoration activities, and these bears would be monitored for habitat use and incidence of human conflict over several seasons to inform future releases. The adaptive management phase could include transitioning to alternative C and the release of additional bears to achieve an initial population of 25 grizzly bears; however, if pursued, impacts would be reflective of alternative C (see alternative C below). Therefore the scope of analysis for alternative B focuses on the primary phase with the release of up to 10 grizzly bears. Most impacts would occur within the area of the ROI closest to the single release site within the NCE.

Employment. Alternative B could result in impacts on employment related to tourism, agriculture, cattle grazing, mining, timber harvest, wildlife management, or federal land management, although the likelihood would be extremely low given the number of bears released. Impacts on all of these sectors, with the exception of wildlife and federal land management, are described separately in the sections below. Most increases in employment in wildlife management and federal land management resulting from this alternative would likely occur as wildlife and federal land managers capture and release grizzly bears. More NPS, FWS, and USFS staff would likely be required during this phase to successfully release and monitor the initial population of grizzly bears and educate the public at large about grizzly bears in the NCE.

Tourism. Under alternative B, no closures to wilderness areas are expected; however, occasional, localized wilderness closures for public safety during release activities could occur, but these would be site-specific and short (hours to days). Tour operators or recreational visitors, including hunters or horseback riders, are not expected to be substantially affected by these closures because the release areas would be remote, closures would be publicized, and operators and the public could avoid these areas and travel elsewhere within the extensive wilderness of the NCE if necessary. Additionally, increased public outreach and education efforts to promote general bear awareness and provide education on clean camping and the use of bear repellant spray containing capsicum would be provided for tourists and hunters to mitigate impacts when they are in the grizzly bear habitat. Any area closures are anticipated to be infrequent and very small in scope; therefore, revenue and employment associated with tourism, including hunting, horseback riding, hiking, sightseeing, and tour operations, would not be noticeably affected as a result of this alternative in or adjacent to the ROI.

It is possible that restoration of grizzly bears into the NCE could attract tourists who are interested in seeing the grizzly bears from a distance, which would benefit the local economy through increased spending that supports local jobs and income; however, any change in tourism is likely to be negligible. While there may be some perceived safety risk on the part of backpackers, in the long term, they are anticipated to become re-accustomed to hiking in grizzly bear habitat, and public outreach and education would make most backpackers comfortable with backpacking in the NCE similar to conditions that exist today. Therefore, impacts on backpacking-related revenues are not likely to be noticeably impacted.

Collaboration with potential user groups and public outreach and education would likely mitigate many potential tourism-related adverse impacts as wilderness users become accustomed to backcountry practices that reduce chances for negative interactions with grizzly bears. Therefore, potential adverse tourism-related impacts in and adjacent to the ROI would be mitigated to the extent that no adverse impacts on tourism are expected as a result of this alternative.

Agriculture and Livestock Grazing. Grizzly bear depredation is highly variable between and among years (DOI 2000). Projections of depredation rates based on other areas is difficult because of differences in terrain, vegetation, size of farms, livestock husbandry practices, and food abundance (DOI 2000). A study conducted by Gunther et al. (2004) between 1992 and 2000 found that most of the livestock depredations in the GYE by grizzly bears were cattle—311 cattle out of 436 livestock depredation incidents. Similarly in the NCDE, depredations included an estimated 516 grizzly bears, 34,841 cattle, and 8,500 sheep. Annual grizzly bear livestock depredations in the NCDE were 8 cattle and 17 sheep. According to Gunther et al. (2004), permanent removal of chronic depredators was the most effective method of alleviating livestock losses. Incidents of damage to orchards and beehives represented less than 10% of all depredation incidents during this period. Gunther et al. also found that damage to gardens, orchards, and beehives and protection of sheep was relatively easy to prevent using electric fencing (Gunther et al. 2004). According to a study by Wilson et al. (2006), most human-grizzly bear conflicts were associated with concentrated attractants located within productive bear habitat. These attractants include orchards, beehives, livestock boneyards, and cattle and sheep calving areas. The study found that the likelihood of human-bear conflicts was greater where multiple attractants were located within close proximity to one another.

It is unlikely that grazing leaseholders would be affected by release of grizzly bears in the NCE under alternative B because the number of grizzly bears released and monitored would be small. In the unexpected event that impacts occur, they would likely be intermittent. Impacts per grizzly bear are also likely to be much less than in the GYE because grizzly bears relocated under this alternative would be less carnivorous than grizzly bears in the GYE based on the their feeding habits in source areas; therefore, any depredation is expected to occur at a much lower rate than grizzly bears in the GYE. Any impacts on grazing leaseholders' operations could potentially result in reduced employment in cattle ranching in the NCE area or increased costs of operating cattle ranching operations within the NCE. However, this is unlikely because ranchers could be compensated for cattle and sheep killed as the result of a grizzly bear depredation, if funds are available. Additionally, these impacts are somewhat less likely to occur given that most grazing lands are located primarily within an area of lower quality grizzly bear habitat. Figure 14 shows current, active grazing leases within the NCE. The closest grazing lease is located approximately 10 miles from a potential grizzly bear release area.

Currently, 4,100 ewe/lamb pairs and 4,552 cow/calf pairs are authorized to graze during the summer on USFS allotments within the NCE. No livestock are present within the central portion of the NCE because it is national park (USFS 2015). Because approximately only10 bears would initially be released into the NCE under alternative B, it is highly unlikely that depredation would occur during the primary phase.

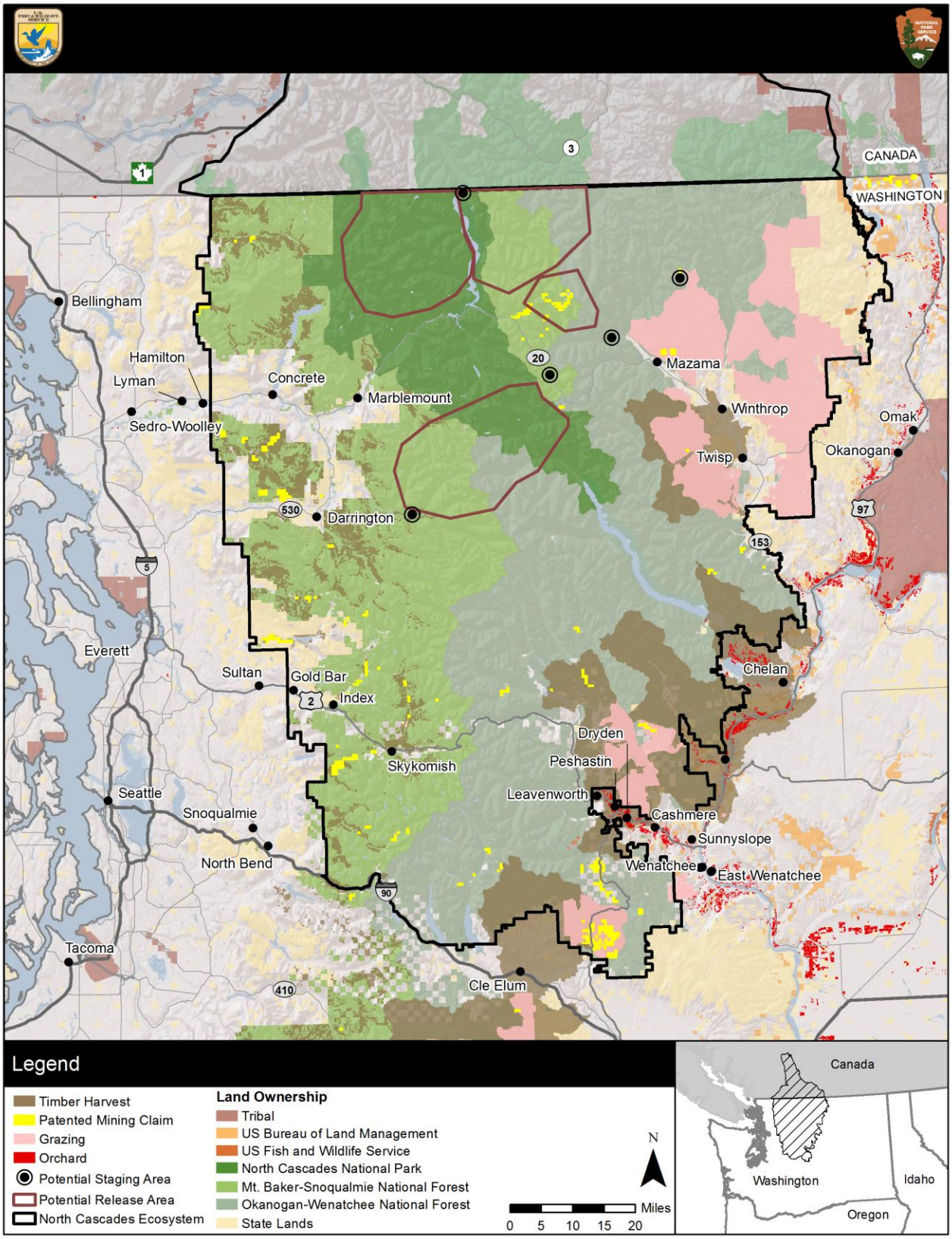

FIGURE 14. AGRICULTURE, TIMBER, AND MINING OPERATIONS IN RELATION TO GRIZZLY BEAR RELEASE AREAS

Adverse impacts on agriculture and livestock grazing would therefore be inconsequential compared to the number of livestock present in or adjacent to the NCE. The potential for impacts could be further reduced by providing grizzly bear education to farmers and ranchers, including education on the use of electric fencing and managed boneyards. All release areas are located away from active grazing allotments, and all released grizzly bears would be GPS-collared and monitored. If a bear frequents an allotment area, the FWS and WDFW would work with the USFS and livestock owners to determine the best course of action to minimize bear-livestock interactions. Agriculture and grazing operations located closest to release areas or suitable grizzly bear habitat would be the most likely to be affected under this alternative. In the unlikely event a grizzly bear depredates agriculture or livestock, appropriate 2002 IGBC guidelines for the NCE would be followed, and the rancher may be compensated for the loss as described in the discussion of compensation for grizzly bear depredation in chapter 2.

Timber Harvest. Leaseholders of timber lands could be adversely affected by release of grizzly bears if grizzly bears move through leased lands while leaseholders are harvesting timber. However, any timber harvest on USFS lands would be subject to ESA consultation requirements, which may allow operators to temporarily disturb bears while continuing to operate. Impacts on timber operations from grizzly bears would be temporary and intermittent because timber is not harvested all the time, timber leases are generally located along the periphery of suitable grizzly bear habitat, and grizzly bears are not expected to be on these lands all of the time. Under alternative B, there would be little to no potential for lost work hours and employment based on the small number of bears released. If a timber company chooses to temporarily stop work as the result of safety considerations of their workers, any lost time would be minimal. Any impacts could be mitigated by allowing workers to harvest other lands if available, although some small, temporary, and intermittent impacts on employment and income of site workers could be possible.

Mining. Similar to impacts described for timber harvests, holders of mining claims may be adversely affected if grizzly bears pass through leased lands while mining is in progress. However, because of the small number of bears released under the primary phase of alternative B and the fact that the closest mining claim is at least 15 miles from the nearest potential release area, the likelihood of these impacts would be very low. In the event that grizzly bears are present in or near mining leases, they are expected to move through in minutes to hours; therefore, these impacts are anticipated to be temporary and very intermittent if they occur at all. Some lost work hours and employment could occur if a mining company chooses to temporarily stop work for safety reasons related to workers working around grizzly bears.

Cumulative Effects

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on socioeconomics under alternative B include ongoing NPS trail maintenance and repairs, NPS fire management operations, forest vegetation management, motorized travel management projects, and implementation of the *Stehekin River Corridor Implementation Plan*. Additional ongoing and reasonably foreseeable future actions with potential socioeconomic impacts include CERCLA mine cleanup projects on USFS lands, mining operations on USFS lands, cattle and sheep grazing on USFS lands, a domestic/bighorn sheep interaction EIS, issuance of special-use permits, forest plan updates, ski area expansions and the expansion of Interstate 90, ongoing USFS trail maintenance and repairs, and USFS wildfire suppression efforts.

NPS trail maintenance and repairs, fire management and suppression activities, motorized travel management projects, and issuance of special-use permits would all continue to benefit visitors of the NCE and subsequently the local tourism industry. However, some trails, roads, and sections of the NCE

may need to be occasionally closed for maintenance or fire suppression activities to motorized vehicles, which could result in temporary reductions in tourism as these areas are closed for a short time for these activities.

Ongoing and reasonably foreseeable future CERCLA mine cleanup projects and mining leases on USFS lands provide local jobs and income to the ROI. Cleanup of mine sites also provides new economic opportunities for future land uses at these sites and provides a cleaner environment for tourists visiting the NCE, which could encourage additional visitation and visitor spending within the ROI. Expansion of two ski areas could allow more visitors to visit, thereby increasing the amount of income and jobs supported by these visitors. Expansion of Interstate 90 would support local jobs and income and allow more visitors to access the ROI. At this time, the exact impact of the expansion on total visitation within the NCE is not known. The development of the Domestic and Bighorn Sheep Interaction EIS could result in a change in the number of domestic sheep leases on USFS lands, which could adversely affect agricultural income in the ROI. Additionally, there are ongoing and reasonably foreseeable future cattle and sheep grazing allotments on USFS lands. These allotments support local jobs and income by allowing ranchers to graze their cattle and sheep on USFS lands.

Overall, cumulative actions would result in both adverse and beneficial impacts on employment, income, and sales in the ROI based on shifts in tourism spending and increased local employment and wages for new projects. Alternative B would contribute negligible impacts on communities, agriculture, and livestock grazing as a result of grizzly-bear human interaction because of the very small number of grizzly bears released compared to the size of the NCE and the size and location of human presence and activity relative to the potential release sites of the grizzly bears. Alternative B is not likely to contribute noticeable impacts on tourism, and it may contribute some benefits in the form of slight increases in tourism from tourists visiting the NCE who are interested in learning about or seeing grizzly bears. Alternative B would contribute a negligible increment to cumulative impacts with regard to employment. There could also be beneficial impacts on employment as additional staff or contractors would be brought on for monitoring activities. Alternative B is not likely to result in any impacts on mining or timber operations within the NCE because of the small number of grizzly bears being released and the distance between these release sites and the operations.

Conclusion

As described above, alternative B would contribute both adverse and beneficial, albeit negligible, impacts on employment, communities, agriculture, cattle grazing, tourism, timber harvesting, and mining as the result of releasing 10 grizzly bears into the NCE over 2 years. Impacts on communities would be small in the primary phase. More NPS, FWS, and USFS staff would be required during the primary phase to implement the project and educate the public. Tourism could be beneficially as affected because grizzly bears may draw more tourists to the area and negatively affected because some areas may be temporarily and intermittently closed to tourists and some visitors may choose to avoid the NCE due to the presence of grizzly bears. Agriculture and livestock grazing would be unlikely to be affected during the primary phase given the small number of bears that would be released under this alternative, depredation compensation programs, and relative distance that these operations are located from potential grizzly bear release sites. Impacts on timber harvests and mining operations would also be intermittent and short term because of the small number of bears present relative to the total amount and location of these types of operations. Present and reasonably foreseeable future actions would contribute both beneficial and adverse impacts, as analyzed above. Cumulative effects on socioeconomics under alternative B would be beneficial. Overall, alternative B would likely result in very limited, adverse impacts based on the small number of bears released into the NCE during the primary phase, while providing some benefits related to tourism.

Alternative C: Incremental Restoration

Impacts on employment, tourism, agriculture and livestock grazing, timber harvesting, and mining operations under alternative C would occur earlier and would be greater relative to those described under alternative B because the primary phase of this alternative would result in the release of up to 25 grizzly bears during the primary phase and eventually result in a restored population of 200 grizzly bears. Therefore, the potential for increased adverse impacts on tourism, mining, timber, agriculture, cattle grazing, and impacts on local employment and populations would be felt a few years earlier than under alternative B and would be incrementally greater than those impacts described under alternative B. Overall impacts on jobs, income, and sales in the ROI could be greater during the primary phase and adaptive management phase—resulting in more jobs being created in both phases—although the relative difference in number of jobs is likely to be negligible.

Impacts on tourism would likely be similar to those described under alternative B; however, they would be greater in the primary phase because more bears would be released during this phase, which could result in a greater chance of interaction between the grizzly bears and tourists, although the overall population density of bears present in the NCE would be low. These impacts would be beneficial in terms of the potential for increased number of tourists coming to the NCE to see grizzly bears and adverse in terms of the types of tourism that could be negatively affected by wilderness closures. However, these releases would be intermittent, occur in remote areas, and closures would be publicized allowing for most of these potential adverse impacts to be avoided.

Alternative C would result in slightly more adverse, temporary impacts on agriculture and livestock grazing because more grizzly bears would be released earlier and over the long term under this alternative, leading to the potential for more impacts to occur to these resources than under alternative B. In order to estimate potential depredation effects, a U.S. Department of Interior formula used in the development of the final EIS for Grizzly Bear Recovery in the Bitterroot Ecosystem, was considered as described below (DOI 2000):

$$\frac{\text{Number of cattle/sheep (NCE)}}{\text{Number of cattle/sheep (Other Ecosystems)}} \times \frac{\text{Number of grizzly bears (NCE)}}{\text{Number of grizzly bears (Other Ecosystems)}} \times \text{Mean annual depredations (Other Ecosystems)} = \text{Estimated annual depredations in NCE}$$

Assuming a restored population of 200 grizzly bears and using the U.S. Department of the Interior's formula, one cow and two sheep are estimated to be killed annually once the restoration goal is reached, which is expected to take 60 to 100 years under this alternative. However, it is probable that the actual number of cattle and sheep killed would be less due to a number of factors including juxtaposition of bear habitat and grazing; type of grazing operation; distribution and abundance of other predators; and abundance and distribution of prey. However, even with this uncertainty, the total number of cattle and sheep depredated within the NCE would result in few if any adverse impacts on agriculture and livestock grazing operations.

Impacts on timber harvesting and mining would be similar to those described under alternative B; however, the impacts would likely be incrementally greater during adaptive management under alternative C given that the number of grizzly bears released under alternative C would be up to 25 bears compared to 10 under alternative B and would be greater in the long term as the restored population of 200 grizzly bears is achieved. However, impacts on timber harvesting and mining are still anticipated to be intermittent and short term, lasting minutes to hours, as workers become aware of grizzly bear presence in the area.

Cumulative Effects

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on socioeconomics under alternative C are the same as those described under alternative B. Overall, cumulative actions would result in both adverse and beneficial impacts on employment, income, and sales in the ROI based on shifts in tourism spending and increased local employment and wages for new projects. Alternative C would contribute adverse and potentially beneficial impacts as described above associated with the release of 25 bears over 5 to 10 years and periodic subsequent releases in the future. As a result, when the primarily adverse and beneficial impacts of alternative C are combined with the effects of other cumulative actions in the ROI, an overall beneficial cumulative impact on socioeconomic resources is expected. Alternative C would contribute a negligible increment to the overall cumulative impact.

Conclusion

Under alternative C, impacts would be both adverse and beneficial, albeit negligible, on employment, agriculture, cattle grazing, tourism, timber harvesting, and mining; however, they would be incrementally greater than those impacts described under alternative B. More NPS, FWS, and USFS staff would be required during both the primary phase and adaptive management phase to implement the project and educate the public. Tourism could be beneficially affected because grizzly bears could draw more tourists to the area; it could also be negatively affected because some additional areas may be closed to tourists on an intermittent and temporary basis. Agriculture and livestock grazing would be more likely to be affected given the larger number of bears that would be released under this alternative; however, given depredation compensation programs and the relative distance that these operations are located from potential grizzly bear release sites these impacts are still anticipated to result in few if any adverse impacts. Impacts on timber harvests and mining operations would still be intermittent and short term because of the small number of bears present relative to the total amount and location of these types of operations. Present and reasonably foreseeable future actions would contribute beneficial and adverse impacts, as analyzed above. Overall, cumulative effects on socioeconomics under alternative C would be negligible. Overall, alternative C would likely result in some adverse impacts on socioeconomic resources, although there would also be benefits, especially to tourism because some additional visitors may come to the NCE to see grizzly bears in the NCE.

Alternative D: Expedited Restoration

Impacts under alternative D would ultimately be greater and more adverse than those described under alternative C during the primary phase of the restoration of grizzly bears into the NCE. As the restoration goal of 200 grizzly bears would be reached over a shorter period (25 years) under this alternative, the degree of impacts on tourism, mining, timber, agriculture, cattle grazing, and impacts on local employment and populations would likely be felt much earlier than they would under alternative C. For example, any impacts on agriculture and livestock operations would likely occur much earlier during the primary phase than under alternative C. Additionally, it is likely that employment impacts on NPS, FWS, and USFS staff would be greater during the primary phase because of both the larger volume of grizzly bears being captured and released and the likely additional amount of public outreach, education, and conflict mitigation that they would need to undertake in the primary phase. Further, it would likely be more difficult to manage socioeconomic impacts because less initial information about grizzly bear space use, habits, and movement patterns would be available, which would make impact mitigation more difficult under this alternative. In addition, bears would likely move outside the NCE sooner, which could result in earlier impacts on socioeconomic resources, but these impact would ultimately be same as described under alternative C in the long term. Therefore, initial socioeconomic impacts would likely be greater and more adverse under this alternative relative to alternative C.

Cumulative Effects

Ongoing and reasonably foreseeable future actions with the potential to contribute to cumulative effects on socioeconomics under alternative D are the same as those described under alternative B. Overall, cumulative actions would result in both adverse and beneficial impacts on employment, income, and sales in the ROI. Alternative D would contribute the same impacts as described above under alternative C, although many impacts on socioeconomic resources would likely occur earlier due to the accelerated rate at which the restoration goal (200 bears) would be achieved. Therefore, the contribution from alterative D to the overall cumulative impacts on socioeconomics would be adverse, although likely small, to many of the socioeconomic resources, although some benefits could occur for tourism.

Conclusion

Under alternative D, because the restoration goal of 200 grizzly bears would be reached over a shorter period (25 years), impacts would be both adverse and beneficial, albeit negligible, on employment, agriculture, cattle grazing, tourism, timber harvesting, and mining, but would be greater than the impacts described under alternative C during the primary phase. More NPS, FWS, and USFS staff would be required during the primary phase to implement the project and educate the public. Tourism could be more beneficially affected under this alternative because more grizzly bears may draw more tourists to the area and could be slightly negatively affected because some additional areas may be temporarily and intermittently closed to tourists during the primary phase. Agriculture and livestock grazing would be more likely to be affected during the primary phase given the larger number of bears that would be released; however, given depredation compensation programs and the relative distance that these operations are located from potential grizzly bear release sites these impacts are still anticipated to result in few if any adverse impacts. Impacts on timber harvests and mining operations would be intermittent and short term because of the small population density of bears in the NCE relative to the total amount and location of these types of operations. Present and reasonably foreseeable future actions would contribute beneficial and adverse impacts, as analyzed above. Overall cumulative impacts on socioeconomics would be adverse, although likely small, to many of the socioeconomic resources, although some benefits could occur for tourism.

Areas outside the NCE

As discussed above, adverse and beneficial impacts on employment, income, and sales could occur as a result of impacts on communities, tourism, agriculture, cattle grazing, timber harvests, and mining. If grizzly bears move outside the NCE but remain in suitable bear habitat, benefits associated with tourism could occur as visitors are more likely to see grizzly bears in other areas. However, if bears move outside suitable habitat, adverse impacts on socioeconomic resources could occur. A large number of bears is unlikely to leave the NCE; it is more likely that individuals dispersing or attracted to human uses could adversely affect socioeconomic resources. Given the large diverse economy of Washington, bears are unlikely to have any noticeable impacts, although individual landowners could experience impacts. However, these impacts would be limited in duration (hours to days), as the agencies implement actions to recapture or remove the grizzly bear causing damage. Impacts associated with capture or removal actions would be minimal because they would be limited to trapping events and would not affect socioeconomic conditions. In addition, under existing ESA 4(d) rules, landowners could be permitted to mitigate or eliminate grizzly bear impacts or damage and compensation could be provided as currently allowed under state law in Washington, if funding is available.

In the event that the option to designate the NCE population of grizzly bears as a section 10(j) experimental population is implemented, additional management measures may become available to managers to further reduce any impacts on communities or economic sectors.

ETHNOGRAPHIC RESOURCES

Although various federal laws and executive orders pertain to the management of cultural resources by all federal agencies (see chapter 1), some agencies provide additional guidance on resource management. For example, the NPS Director's Order 28: *Cultural Resource Management* outlines the standards and requirements for managing all cultural resources on park lands and specifically, ethnographic resources, whereas the USFS Handbook 2309.12 provides guidance on heritage program management. As noted in chapter 3, not all agencies use the term "ethnographic resources" to describe these types of resources; sometimes they are called traditional cultural properties, which are considered a category of historic property (defined as a building, site, district, structure, and object) with specific cultural significance that can be listed in the national register of historic places and addressed by the *National Historic Preservation Act*. For this draft plan/EIS, guidance specifically applying to traditional cultural properties would not apply to the grizzly bear as an ethnographic resource.

Methods and Assumptions

The analysis of impacts on ethnographic resources considers potential impacts that may result from grizzly bear restoration under each alternative. Impacts for this resource topic were analyzed using information on ethnographic resources available in published literature as well as information provided by cultural resource experts from the NPS and USFS along with a number of tribes consulted with on this project. A qualitative analysis was performed by subject matter experts, based on professional judgment and supported by the information described above.

Beneficial and adverse impacts on ethnographic resources could occur as a result of this draft plan/EIS. Beneficial impacts can be both intangible and tangible. For example, the agencies assumed that the return of grizzly bears to the NCE would have beneficial impacts by reinforcing an existing connection between tribal oral histories, ceremonies and sacred areas, and with the bears themselves. This is an intangible benefit that results from the physical presence of the bears within the area of traditional use and importance to the tribes. In the long term, the return of grizzly bears to the NCE may lead to the ability of the tribes to hunt these animals for subsistence and ceremonial uses.

For this analysis, the agencies assumed that the faster the grizzlies were restored to the NCE, the better chance that tribes would be able to continue traditions associated with these animals and ensure that they were passed down to younger tribal members. Additionally, the agencies assumed that the more bears present within the NCE would also facilitate the continuation of cultural traditions by increasing the likelihood of their presence within areas of traditional use. Therefore, the analysis of beneficial impacts was based on the growth of the grizzly population over time and the total length of time needed to achieve the restoration goal of 200 bears.

However, the release of grizzly bears may affect the tribes' use of important areas for hunting and gathering or ceremonial use. The potential for restricted access to some areas could lead to adverse impacts on ethnographic resources. For the analysis, the agencies assumed that the activities associated with releasing the bears within the North Cascades could result in adverse impacts by temporarily restricting access to ethnographic resources. The agencies assumed that closures would be temporary—no more than a few days—and could occur after the release of a bear.

Grizzly bears could target some of the plants that are important to tribal people, such as huckleberry, and reduce the amount available for gathering. However, given the restoration goal (200 bears), the area being considered for their release, and the omnivorous nature of the animals, it is highly unlikely that grizzly bears would reduce these resources to the extent that there would be an impact on tribal use. The low likelihood for conflicts between bears and human resources is well documented in other sections of this

document. Therefore, the analysis below focuses on bears as ethnographic resources and potential impacts from restricted access.

The identification and determination of impacts is best accomplished through tribal consultation aimed at reviewing the relationship between the action alternatives and known resources. Tribal consultation has been initiated for this project and is still in progress, with meetings scheduled for the winter 2017. The draft impact analyses below are a discussion of the potential impacts on ethnographic resources. Tribal consultation may lead to additional and more detailed impacts. Although some published information is available on ethnographic resources within the Northern Cascades, site-specific location information and traditional names or uses of areas are not included to protect confidential information until tribal consultation indicates it is acceptable to talk about these areas and uses.

Issues Analyzed. The analysis of impacts on ethnographic resources under each alternative is based on the following issue statements that are identified in chapter 1:

> **Issue Statement.** The grizzly bear is an important part of tribal culture and history in the Northwest. The decline or restoration of grizzly bears would be likely to affect ethnographic resources in various ways.

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

Under the no-action alternative, grizzly bears would not be released into the U.S. portions of the NCE, but the USFS and NPS would continue to maintain a core area of grizzly bear habitat (per a 1997 interim agreement). This alternative could have a negative impact on ethnographic resources because the chance of a population of grizzly bears moving back into the NCE on their own would be small. Grizzly bears as an ethnographic resource would continue to be absent from this area, which could impede tribal connections to the area and to the animal that has been maintained via oral histories and cultural practices. There is no chance that grizzly bears would move into the NCE much less achieve the target population, which could result in permanent, adverse impacts on the animal as an ethnographic resource. The exact nature of these impacts would be determined through consultation with the tribal communities that continue to use the area. Other ethnographic resources would not be affected under this alternative. No management activities associated with releasing grizzly bears would occur that could impede access to ethnographic resources or impact cultural uses.

Cumulative Effects

Past, present, and reasonably foreseeable actions that have the potential to impact ethnographic resources in the NCE are primarily occurring on national forest lands and include forest vegetation management, cattle and sheep grazing, motorized travel management, mining, CERCLA mine cleanup and abandoned mine land projects, ski area expansion, wildfire suppression, aquatic restoration, and goat relocation. These projects have the potential to have both adverse and beneficial impacts on ethnographic resources. Projects that have the potential to cause ground disturbance or remove important vegetation, such as cattle and sheep grazing, mining activities (including cleanup), ski area expansion, and wildfire suppression, could result in adverse impacts on ethnographic resources by removing important plants or making it difficult to access and use traditional areas. Areas used for traditional purposes, either gathering plants and animals or for ceremonial use could be directly affected by ground-disturbing activities that remove plants, animals, or places or could be indirectly affected by introducing sound and visual changes that make the use of an area difficult. Overall, the agencies would consult with the tribes to ensure that these activities and their corresponding impacts are minimized or avoided.

In general, forest vegetation management tends to consider potential impacts on ethnographic resources and can have beneficial impacts by maintaining important plants within traditional areas. Aquatic restoration and goat relocation could also benefit ethnographic resources by ensuring animal species important to tribes remain within traditional use areas.

Under the no-action alternative, grizzly bears would not be released into the NCE and would likely become extirpated within the area. This would have an adverse impact on ethnographic resources by removing an entire category of ethnographic resources from the area. The tribes would no longer be able to associate important activities and traditions with the grizzly bear in the NCE area. This, combined with the other activities described above, would result in overall adverse cumulative impacts on all ethnographic resources, and alternative A would contribute a noticeable adverse increment to the loss of those resources.

Conclusion

Ethnographic resources are defined by the community to which they are important. The tribes that maintain connections to the NCE have documented ethnographic resources, heritage resources, and traditional cultural properties within the NCE, including the grizzly bear. Grizzly bears would not repopulate the NCE, and the agencies would not take any actions to relocate bears to the NCE under this alternative, leading to permanent adverse impacts on ethnographic resources. However, there would be no potential adverse impacts on other ethnographic resources, such as hunting and gathering, associated with this alternative because the release of bears would not occur. When alternative A is considered with other past, present, and reasonably foreseeable projects, adverse cumulative effects associated with the loss of the grizzly bear as an ethnographic resources are possible, but given the current population status of the grizzly bear in the NCE, these adverse impacts are not anticipated to substantially alter the overall ethnographic resources within the NCE. The no-action alternative would have a noticeable contribution of adverse impacts on overall adverse cumulative impacts from the absence of grizzly bears as an ethnographic resource.

Alternative B: Ecosystem Evaluation Restoration

Under alternative B, the primary phase of grizzly bear restoration would release bears in the first 2 years, followed by 2 years of monitoring with the decision of future releases of grizzly bears and the age and sex ratios of those grizzly bears based on the results of monitoring. Depending on the outcome of monitoring, managers could decide to repeat the initial release and continue monitoring or transition to alternative C. If managers decide to move toward implementation of alternative C during the adaptive management phase of this alternative, the impacts would coincide with those described for alternative C below.

This alternative would have a beneficial impact on the ethnographic resource by ensuring that grizzly bears continue to be present within areas of traditional tribal use. The potential for short-term, negative impacts on some ethnographic resources, such as traditional tribal hunting and gathering areas, associated with the management activities proposed under this alternative is very small. The release of grizzlies may require the temporary closure of areas in the days immediately after the release. Alternative B would result in 5 days of bear releases per year for the first 2 years and would likely be spread out temporally based on when bears are captured from source populations. In addition, under alternative B, bears would be released in one remote location, which would be planned to minimize the need for any closure. If closures did occur, they would be short (for this analysis less than a few days for a maximum of 15 days per year). Consultation with the tribes prior to any releases to identify potential conflicts with proposed release areas and ethnographic resources could avoid any adverse impacts. The beneficial impacts of restoring an ethnographic resource could help offset any limited adverse effects related to limited access restrictions.

Cumulative Effects

Past, present, and reasonably foreseeable actions with the potential to contribute to cumulative effects on ethnographic resources under alternative B would be the same as those described for alternative A above. These actions could have both adverse and beneficial effects on ethnographic resources as described above. While slow, the restoration of grizzly bears to the NCE would be a benefit to ethnographic resources by ensuring that grizzly bears continue to be present. This, considered with other projects, would contribute to overall beneficial cumulative impacts on ethnographic resources. Given that the adverse impacts associated with management activities would be very temporary and could be avoided in many instances, they are not anticipated to contribute to adverse cumulative impacts.

Conclusion

The restoration of the grizzly bear would result in the restoration of an ethnographic resource largely absent from the NCE. Alternative B would result in benefits on ethnographic resources, but the rate of these benefits would take longer to fully achieve, based on the small number of bears released under alternative B. Some adverse impacts on other ethnographic resources could occur as a result of reduced access during the proposed management activities associated with the release of grizzly bears. However, bears would be released in one remote location with consideration of tribal access to that site, and those areas would be avoided to the extent possible. The benefits of the alternative would contribute to the beneficial impacts from other projects and result in overall beneficial cumulative effects by ensuring that grizzly bears continue to be present in the NCE. Overall, the benefits provided by alternative B would likely offset any minimal adverse impacts on ethnographic resources that may occur.

Alternative C: Incremental Restoration

Under this alternative, approximately 25 grizzly bears would be released into the NCE over the course of 5 to 10 years. This initial population would then be allowed to grow naturally, albeit most likely with some additional bears translocated during adaptive management, with the goal of achieving a population of around 200 grizzly bears. Subsequent releases of bears every few years may be necessary to further address restoration objectives. This alternative would have a beneficial impact on the ethnographic resource by ensuring that grizzly bears continue to be present within areas of traditional tribal use. However, the benefits from achieving the target population would not be achieved for 60 to 100 years, which could reduce the ability of the tribes to maintain important cultural connections and traditions and pass these traditions on to younger members.

Potential adverse impacts on other ethnographic resources, such as hunting and gathering areas, are anticipated to be similar to those described under alternative B; however, they would extend for additional years and would be distributed across several sites. Closures would be temporary, no more than a few days, and would occur after the release of a bear. Under this alternative, there could be a maximum of 75 days of temporary closures over the course of 5 to 10 years. Multiple, remote release sites would be used, which could increase the chance that one of these release sites affects an area of traditional use. As described under alternative B, the agencies would consider the potential effects of release sites on tribal use and avoid areas of tribal use to the extent possible.

Cumulative Effects

Past, present, and reasonably foreseeable actions with the potential to contribute to cumulative effects on ethnographic resources under alternative C would be the same as those described for alternative A above. These cumulative actions could have both adverse and beneficial effects on ethnographic resources as described above. Impacts from alternative C are anticipated to be the similar to those described under

alternative B but would be achieved at a different rate because more grizzly bears would be initially released—up to 25 bears over 5 to 10 years. Overall cumulative effects on ethnographic resources would be beneficial, and alternative C would contribute a beneficial increment to these cumulative impacts through the restoration of the grizzly bear as an ethnographic resource.

Conclusion

Alternative C would have long-term benefits on ethnographic resources by ensuring the continuation of the grizzly bear—an important ethnographic resource within the NCE; however, it would take many years (60 to 100) for the full benefits to be achieved. Some adverse impacts on other ethnographic resources could occur as a result of reduced access during the restoration activities associated with the release of grizzly bears. However, the agencies would take steps to reduce the potential conflict with tribal use of areas. Avoidance of tribal use areas during release site identification would help reduce potential adverse impacts. The overall benefits of restoring grizzly bears would contribute to the beneficial impacts from cumulative actions and result in beneficial cumulative effects. Overall, alternative C would largely result in beneficial impacts by restoring an ethnographic resource and would seek to limit adverse impacts associated with access limitations.

Alternative D: Expedited Restoration

This alternative would not limit the population goal for the primary restoration phase to 25 animals; rather, the number of suitable grizzly bears captured in a given year would be released into the NCE. It is anticipated that the logistics and capacity of management agencies to carry out capture and release would constrain the ability to release a large number of grizzly bears in any single year under this alternative (the actual number of grizzly bears to be released per year would likely be five to seven). Therefore, the target population of 200 grizzly bears would be achieved in a shorter time than under other alternatives—approximately 25 years. This alternative would benefit ethnographic resources by ensuring grizzly bears are present within the NCE in numbers that would increase their likelihood of being present within areas of tribal traditional use. The shorter time frame for these benefits would lead to an increased ability of the tribes to continue and maintain cultural traditions through generations.

The potential adverse impacts on other ethnographic resources, such as hunting and gathering areas are anticipated to be the same under this alternative as under alternative C on an annual basis, with a maximum of 15 to 21 days of temporary closures in limited areas per year. However, because active restoration would last approximately15 years longer than under alternative C, the potential for adverse impacts would be highest under this alternative. Similar to alternative C, multiple, remote release sites would be identified. Given the number of bears to be released, additional sites could be required. The agencies would attempt to avoid tribal use areas and limit access restrictions to the extent possible. However, alternative D would have the highest potential for access restrictions given the number of bears released over a longer initial period.

Cumulative Effects

Past, present, and reasonably foreseeable actions with the potential to contribute to cumulative effects on ethnographic resources under alternative D would be the same as those described for alternative A above. These cumulative actions could have both adverse and beneficial effects on ethnographic resources as described above. The cumulative effects of alternative D are anticipated to be similar to those described under alternative C but could affect more ethnographic resources during active restoration because releases would occur over a 25-year period. Overall cumulative effects on ethnographic resources would be beneficial, and alternative D would contribute a beneficial increment to these cumulative impacts through the restoration of the grizzly bear as an ethnographic resource.

Conclusion

Under alternative D, impacts on ethnographic resource would be long term and beneficial because the grizzly bear population within the NCE would be restored. These beneficial impacts would be achieved within the lifetime of some tribal members—a faster rate than under other alternatives. Some adverse impacts on other ethnographic resources could occur as a result of limited access during the proposed management activities associated with the release of grizzly bears. As described above, efforts would be made to avoid areas of tribal use to the extent possible to help avoid access restrictions. Given the number of bears released and the years of active restoration needed, the likelihood of access restrictions that could affect tribal use areas is higher compared to the other action alternatives. Alternative D would contribute to the beneficial impacts from other projects and result in beneficial cumulative effects by ensuring that grizzly bears continue to be present. Overall, alternative D would benefit ethnographic resources in a way similar to that described for alternatives B and C, although it would achieve restoration at a faster rate. However, alternative D has a higher chance of adverse impacts related to access restrictions during the initial phase of restoration. Overall cumulative effects on ethnographic resources would be beneficial, and alternative D would contribute a beneficial increment to these cumulative impacts.

Areas outside the NCE

Ethnographic resources also occur outside the NCE, throughout Washington State. Bears moving out of the area would still contribute in a beneficial way as an ethnographic resource. However, actions taken to recapture grizzly bears if deemed necessary could result in some small, adverse impacts on ethnographic resources if they result in area closures as the agencies attempt to recapture the bear. Recaptured bears would likely be returned to the NCE if there was not a human-bear conflict that requires the bear to be removed from the population. However, even the removal of individual bears would not eliminate the overall restored population as an ethnographic resource once restored to the NCE.

In the event that the option to designate the NCE population of grizzly bears as a section 10(j) experimental population is implemented, additional management measures may become available to managers to further reduce impacts on ethnographic resources.

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Chapter 5:

CONSULTATION AND COORDINATION

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The *National Environmental Policy Act* (NEPA) regulations require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 Code of Federal Regulations [CFR] 1501.7). This section includes a description of the public involvement process and describes the consultation that occurred during development of this *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (draft plan/EIS), including consultation with tribes, scientific experts, and other agencies. This chapter also includes a list of the recipients of the draft plan/EIS.

HISTORY OF PUBLIC INVOLVEMENT

The public involvement activities for this draft plan/EIS fulfill the requirements of NEPA and the U.S. Department of the Interior regulations for implementing NEPA, including 43 CFR 46.235 and 43 CFR 46.435.

The Scoping Process

The interdisciplinary project team divided the scoping process for this draft plan/EIS into two parts: internal scoping and external or public scoping. Internal scoping involved discussions among the project team regarding the purpose of and need for management actions, issues, management alternatives, mitigation measures, the area of analysis, appropriate level of documentation, available references and guidance, and other related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people have an opportunity to comment and contribute early in the decision-making process. For this draft plan/EIS, project information was made available to individuals, agencies, and organizations early in the scoping process, and opportunities were provided to express concerns or views and to identify important issues or alternatives.

Taken together, internal and public scoping are essential elements of the NEPA planning process. The following sections describe the various ways scoping was conducted for this draft plan/EIS.

Internal Scoping

A two-day internal scoping meeting was held on October 21 and 22, 2014, to discuss the development of a grizzly bear restoration draft plan/EIS for the North Cascades Ecosystem (NCE). During the meeting, the lead agencies, the National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS), and the cooperating agencies, the U.S. Forest Service (USFS) and Washington Department of Fish and Wildlife (WDFW), identified the purpose of and need for action, management objectives, issues, and impact topics, and preliminary alternative approaches. Cooperating agency roles and involvement and the public scoping process were also discussed. The results of the meetings were captured in a report that is part of the decision file for this draft plan/EIS.

Public Scoping

Public scoping was conducted in February and March of 2015. The publication of a Notice of Intent to prepare the draft plan/EIS in the *Federal Register* (FR) on February 19, 2015 (80 FR 33), marked the start of the public scoping period. In addition to the Notice of Intent, preliminary information regarding the

draft plan/EIS was provided to the public and other interested parties through a press release (sent to 700 media outlets) and a public scoping letter (sent to 4,030 interested individuals and organizations). Information was also provided to an additional 2,793 individuals and organizations via email. These announcements notified the public of public scoping open houses and of the opportunity to provide comments on the draft plan/EIS.

The public scoping comment period was open for a total of six weeks between February 13, 2015, and March 26, 2015. During this time, six public scoping open houses were held at the following locations:

- March 3, 2015: Red Barn Main Hall, Winthrop, Washington
- March 4, 2015: Okanogan PUD Meeting Room, Okanogan, Washington
- March 5, 2015: Chelan County PUD Auditorium, Wenatchee, Washington
- March 9, 2015: Putnam Centennial Center Meeting Room, Cle Elum, Washington
- March 10, 2015: Seattle Pacific University Bertona Classroom 1, Seattle, Washington
- March 11, 2015: Bellingham Central Library Lecture Room, Bellingham, Washington

Approximately 495 people attended the six meetings (approximately 80 people attended the meeting in Winthrop, approximately 80 people attended the meeting in Okanogan, approximately 40 people attended the meeting in Wenatchee, approximately 70 people attended the meeting in Cle Elum, approximately 115 people attended the meeting in Seattle, and approximately 110 people attended the meeting in Bellingham).

At each meeting, handouts were available that included information about the background of the project, proposed purpose and need, proposed plan objectives, potential impact topics, NEPA process, and commonly asked questions. This information was also displayed on banners at each meeting venue. NPS and FWS personnel, as well as staff from the USFS and WDFW, were available to answer questions and provide additional information to open house attendees.

Writing stations available at each meeting provided areas where attendees could sit, write comments, and submit a comment form into a box. Attendees who prepared written comments before the meeting could submit those comments using the comment box provided. Attendees had the option to take comment forms and mail them later. Attendees were also encouraged to submit their comments online and were provided information on how to provide comments through the NPS Planning, Environment, and Public Comment website was provided.

During the scoping period, 2,881 pieces of correspondence were received. Following the public scoping period, the NPS reviewed all public comments and a Comment Analysis Report was developed to compile and correlate similar public comments into a format useable by the decision-makers and the planning team. The Comment Analysis Report provides assistance in organizing, clarifying, and addressing technical information pursuant to NEPA regulations and in identifying the topics and issues to be evaluated and considered throughout the planning process. All scoping comments were considered to be important and useful guidance in the draft plan/EIS process.

AGENCY CONSULTATION

U.S. Forest Service

The USFS is a cooperating agency for this draft plan/EIS process and has participated in internal planning meetings, including the internal scoping and alternatives development meetings. The USFS has also contributed to the development of this draft plan/EIS in describing the affected environment, addressing potential impacts that could result from actions in the Mt. Baker-Snoqualmie National Forest and Okanogan-Wenatchee National Forest, and providing the information necessary to support a USFS decision related to this draft plan/EIS (see appendix B).

Washington Department of Fish and Wildlife

The WDFW is a cooperating agency for this draft plan/EIS process and has participated in internal planning meetings, including the internal scoping and alternatives development meetings. The WDFW has also contributed to the development of this draft plan/EIS by describing the affected environment, addressing potential impacts, and discussing the NPS and FWS actions in relation to the state statute. In addition, the North Cascades National Park Service Complex Superintendent and the Supervisor of the FWS Washington Fish and Wildlife Office conducted an in-person briefing with the WDFW Director on May 4, 2016.

Washington State Historic Preservation Office

In accordance with section 106 of the *National Historic Preservation Act*, consultation with the Department of Archaeology and Historic Preservation concerning impacts on cultural resources will be initiated by the NPS and FWS during public and agency review of the draft plan/EIS. A copy of the draft plan/EIS will be provided to the Department of Archaeology and Historic Preservation along with a letter requesting any initial concerns or issues relating to the draft plan/EIS and its potential effects on historic properties within the park.

TRIBAL TREATIES AND CONSULTATION

Tribal Treaties. The park recognizes that the tribes' relationship to lands in the NCE have endured for thousands of years, and NPS and FWS staff continue to work with tribes to ensure that sites of traditional importance are preserved and protected. NPS and FWS staff strive to create and maintain positive, productive, government-to-government relationships with these tribes (NPS 2008a).

Tribal Consultation. During scoping, letters were sent to U.S. federally recognized tribes having an association with the NCE (the Confederated Tribes of the Colville Reservation, Lummi Nation, Muckleshoot Indian Tribe, Nooksack Indian Tribe, Puyallup Tribe of Indians, Sauk-Suiattle Indian Tribe, Snoqualmie Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, Tulalip Tribes, Upper Skagit Tribe, and Yakama Indian Nation). Scoping comment letters were received from the Lummi Nation, the Okanagan Nation Alliance, and the Upper Columbia United Tribes, expressing support for the project. On April 23, 2015, NPS and FWS officials conducted an in-person meeting with leaders of the Upper Skagit Tribe to discuss the draft plan/EIS.

An updated tribal outreach letter was sent on May 17, 2016, to an expanded list of tribes to broaden the scope of tribal outreach for this draft plan/EIS. The expanded list included the Confederated Tribes of the Colville Reservation, Confederated Tribes of the Chehalis Reservation, Cowlitz Indian Tribe, Hoh Tribe, Jamestown S'Klallam Tribe, Kalispel Tribe of Indians, Lower Elwha Klallam Tribe, Lummi Indian

Nation, Makah Indian Tribe, Muckleshoot Tribe, Nisqually Indian Tribe, Nooksack Indian Tribe, Port Gamble S'Klallam Tribe, Puyallup Tribe, Quileute Tribe, Quinault Indian Nation, Samish Indian Nation, Sauk-Suiattle Indian Tribe, Shoalwater Bay Tribe, Skokomish Tribe, Snoqualmie Tribe, Spokane Tribe of Indians, Squaxin Island Tribe, Stillaguamish Tribe of Indians, Suquamish Tribe, Swinomish Indian Tribal Community, Tulalip Tribes, Upper Skagit Tribe, and the Yakama Nation. A subsequent outreach letter was sent to the cultural resource contacts for all Washington tribes on September 14, 2016. Replies were received from the Confederated Tribes of the Colville Reservation and Muckleshoot Tribe. Several tribes requested in-person meetings. A meeting was held with the Swinomish and Lummi tribes on July 26, 2016; the Upper Skagit Tribe on April 23, 2015; and the Sauk-Suiattle Tribe on November 18, 2016. A conference call with the Confederated Tribes of the Colville Reservation was held on August 4, 2016. Tribes will also be notified of the availability of this draft plan/EIS upon its publication.

CONSULTATION WITH FEDERAL AND STATE LEGISLATIVE OFFICIALS

The NPS and FWS have initiated outreach to members of the Washington federal Senate and Congressional delegations and members of the state legislature and will conduct further outreach via letters and briefings in advance of the release of the draft plan/EIS. The NPS and FWS provided in-person briefings to federal and state legislative officials on the following occasions:

- March 11, 2015: Staff – Senators Patty Murray and Maria Cantwell (NPS and FWS)
- March 16, 2015: Staff – Congresswoman Jaime Herrera-Buetler (NPS and FWS)
- April 29, 2015: Sharra Finley, aide to Congressman Dan Newhouse (NPS and FWS)
- May 5, 2015: Washington State Senate Natural Resources/Parks Committee hearing (NPS, FWS, and WDFW)
- June 13, 2016: Staff – Congresswoman Suzan DelBenne (NPS)

LOCAL GOVERNMENT CONSULTATION

The NPS and FWS initiated outreach to county governments prior to publication of the Notice of Intent with the mailing of consultation letters offering to meet with county officials to discuss the draft plan/EIS process, and will conduct further outreach to local government officials upon publication the draft plan/EIS. Letters were mailed prior to publication of the Notice of Intent to the following 13 county councils and commissioners' offices in central and western Washington: the Chelan County Commissioners' Office; Douglas County Commissioners' Office; Grant County Commissioners' Office; King County Council; Kittitas County Commissioners' Office; Lewis County Commissioners' Office; Okanogan County Commissioners' Office; Pierce County Council; Skagit County Commissioners' Office; Snohomish County Council; Thurston County Commissioners Office; Whatcom County Council; and the Yakima County Commissioners' Office.

The NPS and FWS have conducted in-person briefings about the draft plan/EIS with county and local government officials on six separate occasions, as follows:

- January 12, 2015: Okanogan County Commissioners (NPS, FWS, and USFS)
- March 16, 2015: Pierce County Commissioners (NPS and FWS)
- March 24, 2015: Lewis County Commissioners (NPS and FWS)

- June 9, 2015: Skagit County Commissioners (NPS and FWS)
- March 14, 2016: Skagit County Commissioner Lisa Janicki and government representatives from the towns of Hamilton, Concrete, and Lyman (NPS and FWS)
- March 24, 2016: Sedro-Woolley mayor Keith Wagoner (NPS)

LIST OF RECIPIENTS OF THE PLAN / ENVIRONMENTAL IMPACT STATEMENT

Upon publication of the notice of availability of the draft plan/EIS in the *Federal Register*, a news release will be provided to the 700 media outlets who received the news release announcing the Notice of Intent in February of 2015. Notice will be provided to media, interested individuals, and organizations via the NPS and FWS standard mailing /distribution lists, as well as the following:

- The NPS and FWS will use the lists generated from the public scoping meetings and the online signup on the https://www.nps.gov/noca/grizzly.htm page.
- The NPS and FWS will use the email addresses generated from the nce_grizzly@nps.gov email address.
- The FWS will use its news distribution service (Meltwater) to share the news release with instructions on accessing the draft plan/EIS with local (Washington), regional and national media.
- The NPS and FWS will contact state and federal agency partners, tribes, county commissioners, Congressional members' offices, state legislators (in cooperation with the WDFW), local non-governmental organizations, the Interagency Grizzly Bear Committee (IGBC), and other potential stakeholders electronically with the news release, along with instructions on accessing the draft plan/EIS.
- The news release will be posted on the FWS State (Washington) and Regional websites with links and information on accessing the draft plan/EIS.

Hard copies of the draft plan/EIS will be distributed to the following agencies and libraries:

Government Agencies

- United States Environmental Protection Agency Region 10
- United States Department of Agriculture
  - United States Forest Service: Pacific Northwest Region
  - Mount Baker-Snoqualmie National Forest
  - Okanogan-Wenatchee National Forest
- Washington Department of Fish and Wildlife

Local Libraries

- Bellingham Central Library
- Cashmere Library
- Cle Elum Central Library
- Darrington Library
- Everett Public Library
- King County Library System
- Mount Vernon Library
- Okanogan Library

- Omak Library
- Renton Public Library
- Seattle Public Library
- Sedro-Woolley Library
- Sultan Library
- Tacoma Public Library
- Twisp Library
- University of Washington Library
- Wenatchee Public Library
- Winthrop Library

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Kasworm W.

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GLOSSARY

acid deposition: also called "acid rain"; a broad term that includes any form of precipitation with acidic components, such as sulfuric or nitric acid, that fall to the ground from the atmosphere in wet or dry forms.

adaptive management: a systematic approach for improving resource management by learning from management outcomes.

adverse: a change that moves the resource away from a desired condition or detracts from its appearance or condition.

adverse use: any use of a park or its resources which conflicts with the purpose for which the park was established. Adverse use is not as strong a term as "misuse" and does not necessarily refer to flagrant or seriously damaging departures from appropriate use.

aversive conditioning: application of negative reinforcement aimed at behavior modification of a specific animal(s) using hazing techniques on a consistent basis. Examples include the use of rubber bullets, the use of bear spray, noise making devices (e.g., explosives) or flashing lights.

aesthetic/esthetic value: value of a property based on its appearance.

analysis area: the North Cascades Ecosystem grizzly bear recovery zone as described in the North Cascades Ecosystem Recovery Plan chapter of the FWS *Grizzly Bear Recovery Plan*.

animal unit: one mature cow of approximately 1,000 pounds and one calf up to weaning, usually 6 months of age, or equivalent.

animal unit month: the amount of forage required by one animal unit for 1 month. The Natural Resources Conservation Service uses 30 pounds of air-dry forage per day as the standard forage demand for a 1,000-pound cow and her calf (one animal unit.)

avalanche chute: a natural channel down a steep mountain slope, the path followed by an avalanche's tumultuous racing snow and debris.

back country: a part or parts of a park or forest beyond main developed use areas and generally not accessible to vehicular travel. Back country is characteristically of primitive or wilderness nature, of considerable dimensions, and accessible, if at all, only by horse or foot trails or in some cases by unimproved roads.

bear management unit: a geographic location bounded by county, state or topographic borders with a bear subpopulation within it.

bear spray: a spray that is specifically formulated to deter aggressive or attacking bears. Bear spray is specifically labeled for use against bears, and by law, must be registered with the U.S. Environmental Protection Agency and individual states.

beneficial: a change in the condition or appearance of the resource that moves the resource toward a desired condition.

biodiversity: diversity among and within plant and animal species in an environment.

biome: a large geographical area of distinctive plant and animal groups that are adapted to that particular environment.

board foot: a unit of wood measuring 1 inch thick by 12 inches by 12 inches. The volume of 1 BF = 144 cubic inches.

campground: an area with an organized layout, having well defined roads, parking spaces, and camp sites. Drinking water and sanitary facilities, including toilets and refuse containers may be furnished on a community basis.

carrying capacity: the maximum, equilibrium number of organisms of a particular species that can be supported indefinitely in a given environment.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act, otherwise known as Superfund, provides a federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment.

conditioned: describes bear behavior defined by any one or more of the following: has sought and obtained non-natural foods, destroyed property, displayed aggressive (non-defensive) behavior toward humans, or become overly familiar with humans.

conservation: those measures of park management directed toward perpetuating park resources unimpaired for the enjoyment of present and future generations.

context: may include society as a whole (human, national), the affected region, the affected interests, and the locality.

cumulative impact: the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions.

dedicated trail-less wilderness: a class of wilderness that is managed exclusively as a trail-less area, and user-made trails are not permitted. It may include popular attractions accessed only by crosscountry travel. Human impact and influence is minimal; therefore, user restrictions may be necessary to ensure that trail-less experiences remain.

delisting: the removal of a species from the federal lists of endangered and threatened wildlife and plants.

developed area: roads, parking areas, picnic areas, front country campgrounds, concessions and administrative facilities, residences and/or adjacent lands.

ecosystem: a system, or a group of interconnected elements, formed by the interaction of a community of organisms with their environment.

endangered species: any species that is in danger of extinction throughout all or a significant portion of its range.

ethnographic resources: landscapes, objects, plants and animals, or sites and structures that are important to a people’s sense of purpose or way of life.

experimental population: members of a listed species that are geographically separated from other populations of the same species.

fire control: all activities directed toward protection of the parks from fires of all kinds and from all causes. Fire control includes the three sub-activities or functions of fire prevention, presuppression, and suppression.

food economy: refers to the dominant foods available to bears in a given area.

forest visits: a term preferred (rather than "visitation") to express the concept of the volume of public entry and use of forests or of the number of people coming to forests. Similar to park visits.

front country: areas near well-developed trails, sites with picnic tables, areas proximate to ranger stations and/or visitor centers, and designated campgrounds (i.e., those with fireplaces, water pumps, and/or bathrooms).

gateway communities: those cities and towns that are geographically close to the NCE and derive some measurable economic benefit from tourism and related activities within the NCE. For the purposes of this document, these communities are generally located within 60 miles of the NCE.

general trail-less wilderness: a class of wilderness that includes areas not falling into the other classes. It attracts very low use because of a relative lack of trails or destination spots. The area is unmodified, and user-made trails are not encouraged, but may exist.

glacial retreat: when the terminus of a glacier does not extend as far downvalley as it previously did.

guided recreation: activities or sports where individuals participate under the direction of an experienced guide.

habitat: the natural place where plants, animals, or other organisms live.

habitat assessment: a research process that seeks to document the non-monetary value of fish and wildlife resources.

habitat destruction: the process by which natural habitat is damaged or destroyed to such an extent that it no longer is capable of supporting the species and ecological communities that naturally occur there.

habitat modification: actions that physically remove or add elements that change the native habitat.

habituated: bear behavior that includes one or more of the following circumstances: has become accustomed to frequenting developed areas, backcountry campgrounds, trails or roadsides, but has retained its natural foraging behavior. Habituated bears have not necessarily become overly familiar with humans, but are comfortable in the presence of humans.

impounding: confining within an enclosure or within limits.

intensity: the severity or magnitude of an impact. The CEQ identifies 10 factors to be considered in evaluating the intensity of an impact.

interpretive activity/program: an activity that presents the inspirational, educational, and recreational values of the parks in such ways that visitors may derive the utmost in understanding, appreciation, and enjoyment from their experience.

interspecific competition: a form of competition between members of different species inhabiting the same ecological area.

invasive species: those species that are not only non-native, but also negatively impact the environment.

Karelian Bear Dogs: a type of dog used at the point of release when bears are captured and relocated, in order to condition the bear and for Washington Department of Fish and Wildlife employee safety.

less-lethal ammunition: specially formulated ammunition, such as rubber bullets, that is designed to stop a bear with less chance of fatally injuring them or innocent bystanders.

locatable minerals: those minerals which, when found in valuable deposits, can be acquired under the General Mining Laws of 1872 (as amended). Examples include copper, gold, tungsten, nickel, zinc, silver, and lead.

management action: Any action taken by management due to bear activity that directly affects the bear and/or the public. This includes, but is not limited to: trail postings, trail closures, campground closures, bear relocations and bear removals.

mortality limit: the maximum allowable number of incidental mortalities per calendar year assigned unless a shorter time period is specified.

natural wilderness: an area that shows minimal effects of modern civilization upon the ecological systems and their biological and physical components. A natural wilderness comprises landforms, soils, waterways, habitats, species, and terrestrial food webs that are largely intact in their natural state and not influenced by human activities and external threats.

non-native species: those species that have been introduced into new areas that have not historically been part of their native range.

North Cascades Ecosystem Grizzly Bear Recovery Zone: an area in Washington State that encompasses approximately 9,800 square miles, or 6.1 million acres, within the U.S. portion of the North Cascades Ecosystem (NCE). It includes all of the park complex and most of the Mount Baker-Snoqualmie and Okanogan-Wenatchee National Forests.

North Cascades National Park Service Park Complex: an area that includes North Cascades National Park, and Ross Lake and Lake Chelan National Recreation Areas.

noxious plant: vegetation poisonous or irritating to people or animals. (Exotic and noxious are not synonymous.)

ozone: a colorless, odorless reactive gas comprising three oxygen atoms.

pack animal: a mule, donkey, burro, or horse bred for vigor and hardiness and used for carrying heavy loads.

park visits: a term preferred (rather than "visitation") to express the concept of the volume of public entry and use of the parks or of the number of people coming to the parks. Similar to forest visits.

particulate matter: also known as "particulate pollution"; a complex mixture of extremely small particles and liquid droplets.

permit: a special written permission by the NPS or USFS authorizing access to specific remote, wilderness areas and the backcountry.

phenology: the science dealing with the influence of climate on the recurrence of such annual phenomena of animal and plant life as budding and bird migrations.

predation: a relation between animals in which one organism captures and feeds on others.

preservation: protection of the parks from damage, defacement, exploitation of their natural resources, or impairment of the natural or historic scene they present. Preservation is a more restrictive practice than conservation; the two terms should not be used synonymously.

primitive/trailed areas: areas characterized by an unmodified natural environment with a minimum of on-site controls and restrictions, and where present, controls are subtle. Facilities are only provided for protection of wilderness resource values.

pristine/trail-less areas: areas characterized by an extensive unmodified natural environment where natural processes are not measurably affected by the actions of visitors.

public scoping: the early involvement of the interested and affected public in the environmental analysis process.

range curtailment: the contracting or reducing of areas for use by a specific species. This could occur through habitat destruction and modification as well as by the introduction of non-native species.

record of decision: the formal, legal decision document which is recorded for the public.

recovery priority: refers to a number, ranging from a high of 1 to a low of 18, whereby priorities to listed species and recovery tasks are assigned.

recreation: a broad term which may refer to enjoyment of park features and values.

release site: a remote, designated area within National Park Service (NPS) or U.S. Forest Service (USFS) lands where bears will be released.

relocation: to move the bear to another area within NPS or USFS administered lands.

region of influence: the physical area that bounds the environmental, sociological, economic, or cultural feature of interest for the purpose of analysis.

removal: to relocate the bear to an area outside specific NPS or USFS lands or destroy it.

restoration: returning a site or area in a park as nearly as possible to the natural condition in which it was before some artificial alteration took place. Also, renewing or bringing back the elements of an existing historic scene, building, or object as nearly as possible to their original form.

riparian: of, relating to, or situated or dwelling on the bank of a river or other body of water.

special-status species: see species of concern.

species: a biological group of similar plants or animals with common characteristics that are capable of interbreeding.

species of concern: in Washington, these include those species listed as state endangered, state threatened, state sensitive, or state candidate, as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service.

subalpine: growing on mountains below the limit of tree growth, and above the foothill, or montane, zone.

threatened species: any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

trailed wilderness: a class of wilderness that includes all managed system trails. It extends beyond the transition class. This class extends at least 500 feet on either side of the trail, but may be wider around lakes or heavily used areas.

transition wilderness: a class of wilderness that includes system trails that have a travel-way worn to mineral soil over long distances, and is characterized by having a large proportion of day-users, often mixed in with overnight and long distance travelers.

undeveloped wilderness: an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, with the imprint of man's work substantially unnoticeable.

ungulate: a hoofed mammal. Several species of ungulate occur in the NCE, including mule deer, mountain goats, bighorn sheep, elk, and moose.

untrammeled wilderness: an area wherein ecological systems and their biological and physical components are autonomous, free from human intervention. Human actions that restrict, manipulate, or attempt to control the natural world within wilderness degrade the untrammeled quality.

watershed: a region or area drained by a river, stream, etc.

wilderness: wild, undeveloped, and relatively unfrequented portions of a park—back country. Also used in reference to any area where processes of nature are left to develop unmanaged and undisturbed by humans.

wilderness character: a holistic concept based on the interaction of (1) biophysical environments primarily free from modern human manipulation and impact, (2) personal experience in natural environments relatively free from the encumbrances and signs of modern society, and (3) symbolic meanings of humility, restraint, and interdependence that inspire human connection with nature.

wilderness use: visitor use of undeveloped, backcountry areas. A type of park use and occupancy by visitors without benefit of any facilities or services other than possibly foot or horse trails for access.

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Appendices

APPENDIX A: POTENTIALLY AFFECTED FEDERAL AND STATE-LISTED SPECIES

POTENTIALLY AFFECTED FEDERAL AND STATE-LISTED SPECIES

Threatened and Endangered Species

The NCE contains a variety of habitats suitable for special-status species. Fish or wildlife listed under the ESA that could be present or have designated critical habitat within the NCE are listed below in table A-1. All of these species are also on the list of species of concern for USFS Region 6 as either documented or suspected in the Okanogan-Wenatchee and/or Mt. Baker-Snoqualmie National Forests (USFS 2015a)

TABLE A-1. ESA-LISTED SPECIES PRESENT IN THE NORTH CASCADES ECOSYSTEM

Common Name	Scientific Name	Federal Status	State Status	Critical Habitat within NCE	Potentially Affected by Grizzly Restoration
Grizzly Bear	*Ursus arctos horribilis*	Threatened	Endangered	No	Yes
Canada Lynx	*Lynx Canadensis*	Threatened	Threatened	Yes	Yes
Gray Wolf	*Canis lupus*	Endangered Western 2/3 of Washington	Endangered	No	Yes
Northern Spotted Owl	*Stix occidentalis caurina*	Threatened	Endangered	Yes	Yes
Marbled Murrelet	*Brachyramphus marmoratus*	Threatened	Threatened	Yes	Yes
Bull Trout	*Salvelinus confluentus*	Threatened	Candidate	Yes	Yes
Puget Sound Chinook Salmon	*Oncorhynchus tshawytscha*	Threatened	Candidate	Yes	Yes
Upper Columbia River spring-run Chinook	*Oncorhynchus tshawytscha*	Endangered	Candidate	Yes	Yes
Middle Columbia River steelhead	*Oncorhynchus mykiss*	Threatened	Candidate	Yes	Yes
Puget Sound steelhead	*Oncorhynchus mykiss*	Threatened	N/A	Yes	Yes
Chum Salmon	*Oncorhynchus keta*	Threatened	Candidate	No	Yes

Sources: NPS 2015a; USFS 2015a; WDFW 2016a

State of Washington, Department of Fish and Wildlife Special-Status Species

In addition to the federally threatened and endangered species listed above, the NCE is home to several Washington State Species of Concern. Species of Concern in Washington include those species listed as state endangered, state threatened, state sensitive, or state candidate, as well as species listed or proposed for listing by the FWS or the National Marine Fisheries Service (WDFW 2016a). State special-status species found in the NCE are shown in table A-2.

TABLE A-2. WASHINGTON STATE SPECIES OF CONCERN IN THE NORTH CASCADES ECOSYSTEM

Common Name	Scientific Name	State Status	Likely to be Affected by Grizzly Restoration?
River lamprey	*Lampetra ayresi*	Candidate	No
Chinook salmon	*Oncorhynchus tshawytscha*	Candidate	Yes
Chum salmon	*Oncorhynchus keta*	Candidate	Yes
Pygmy whitefish	*Prosopium coulteri*	Sensitive	Yes
Steelhead	*Oncorhynchus mykiss*	Candidate	Yes
Sockeye salmon	*Oncorhynchus nerka*	Candidate	Yes
Bald Eagle	*Haliaeetus leucocephalus*	Sensitive	No
Golden eagle	*Aquila chrysaetos*	Candidate	No
Northern goshawk	*Accipiter gentilis*	Candidate	No
Peregrine falcon	*Falco peregrinus*	Sensitive	No
Sharp-tailed grouse	*Tympanuchus phasianellus*	Threatened	No
Common loon	*Gavia immer*	Sensitive	No
Flammulated owl	*Otus flammeolus*	Candidate	No
Vaux's swift	*Chaetura vauxi*	Candidate	No
Lewis' woodpecker	*Melanerpes lewis*	Candidate	No
White-headed woodpecker	*Picoides albolarvatus*	Candidate	No
Black-backed woodpecker	*Picoides arcticus*	Candidate	No
Pileated woodpecker	*Dryocopus pileatus*	Candidate	No
Townsend's big-eared bat	*Corynorhinus townsendii*	Candidate	No
Keen's long-eared bat	*Myotis evotis keenii*	Candidate	No
Cascade red fox	*Vulpes cascadensis*	Candidate	No
Fisher	*Martes pennantipennant*	Endangered	Yes
Western gray squirrel	*Sciurus griseus*	Threatened	Yes

Sources: WDFW 2014, 2016a

USFS Regional Forester Sensitive Species

In addition to the federally threatened and endangered species listed above, the NCE is home to several sensitive species within Region 6. Sensitive Species are defined as those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density and habitat capability that would reduce a species' existing distribution. Regional Forester Sensitive species found in the NCE are shown in table A-3.

TABLE A-3. REGIONAL FORESTER SENSITIVE SPECIES OF IN THE NORTH CASCADES ECOSYSTEM (REGION 6)

Common Name	Scientific Name	Likely to be Affected by Grizzly Restoration?
Northern goshawk	*Accipiter gentilis*	No
Gray flycatcher	*Empidonax wrightii*	No
American peregrine falcon	*Falco peregrinus anatum*	No
Common loon	*Gavia immer*	No
Sandhill crane	*Grus canadensis*	No
Bald eagle	*Haliaeetus leucocephalus*	No
Harlequin duck	*Histrionicus histrionicus*	No
Lewis's woodpecker	*Melanerpes lewis*	No
White-headed woodpecker	*Picoides albolarvatus*	No
Sharp-tailed grouse	*Tympanuchus phasianellus*	No
Gray wolf	*Canis lupus*	Yes
Townsend's big-eared bat	*Corynorhinus townsendii*	No
Wolverine	*Gulo gulo*	Yes
Little Brown myotis	*Myotis lucifugus*	No
Mountain goat	*Oreamnos americanus*	No
Rocky Mtn. bighorn sheep	*Ovis canadensis canadensis*	No
California bighorn sheep	Ovis canadensis sierrae	No
Pacific fisher	*Pekania pennanti (Outside West Coast)*	No
Western gray squirrel	*Sciurus griseus*	No
Cascade red fox	*Vulpes vulpes*	No
Larch mountain salamander	*Plethodon larselli*	No
Van dyke's salamander	*Plethodon vandykei*	No
Western pond turtle	*Actinemys marmorata*	No
Striped whipsnake	*Coluber taeniatus*	No
Giant palouse earthworm	*Driloleirus americanus*	No
Washington duskysnail	*Amnicola sp.*	No
Masked duskysnail	*Lyogyrus spb.*	No
Puget oregonian	*Cryptomastix devia*	No
Grand coulee mountainsnail	*Oreohelix junii*	No
Chelan mountainsnail	*Oreohelix sp. nov.*	No
Shiny tightcoil	*Pristiloma wascoense*	No
Broadwhorl tightcoil	*Pristiloma johnsoni*	No
Blue-gray taildropper	*Prophysaon coeruleum*	No
Western bumblebee	*Bombus occidentalis*	No

Common Name	Scientific Name	Likely to be Affected by Grizzly Restoration?
Astarte fritillary	*Boloria astarte*	No
Meadow fritillary	*Boloria bellona*	No
Freija fritillary	*Boloria freija*	No
Labrador sulphur	*Colias nastes*	No
Lustrous copper	*Lycaena cupreus*	No
Melissa arctic	*Oeneis melissa*	No
Mardon skipper	*Polites mardon*	No
Peck's skipper	*Polites peckius*	No
Tawny-edged skipper	*Polites themistocles*	No
Great basin fritillary	*Speyeria egleis*	No
Johnson's hairstreak	*Callophrys johnsoni*	No
Zigzag darner	*Aeshna sitchensis*	No
Subarctic darner	*Aeshna subarctica*	No
Subarctic bluet	*Coenagrion interrogatum*	No
Pacific lamprey	*Entosphenus tridentatus*	Yes
Lake Chub	*Couesius plumbeus*	Yes
Westslope Cutthroat trout	*Oncorhynchus clarkii lewisi*	Yes
Inland Columbia Basin redband trout	*Oncorhynchus mykiss gairdneri*	Yes
Pygmy whitefish	*Prosopium coulterii*	Yes

Yes = May impact individuals, but is not likely to cause a trend toward federal listing or a loss of population viability.

APPENDIX B: ADDITIONAL ANALYSIS FOR USFS DECISION-MAKING SUPPORT

ADDITIONAL ANALYSIS FOR USFS DECISION-MAKING SUPPORT

NCE Grizzly Bear Restoration Plan/EIS
Compliance with USFS Statutes, Policies, and Plans

Biological Evaluation

Forest Service Manual 2670.31 and 2670.32 require the use of the biological evaluation process to review any actions authorized, funded, or carried out by the Forest Service to determine their potential for effect on threatened, endangered, and sensitive species.

In addition to analysis in Chapter 4, the following analysis serves as both a NEPA assessment of impacts to federally listed species (federal endangered, threatened, or candidate) that could be impacted by grizzly bear management actions and a biological assessment under the ESA. Other special-status species (state endangered, threatened, candidate, or species of concern) and NFS listed species (Regional Forester Sensitive, Management Indicator, and Survey and Manage) are also discussed.

The restoration of grizzly bears to the NCE would have minimal effects to other species. Grizzly bears consume certain plant and animal species but they are native to the NCE and have coexisted with all these other native species. Their reintroduction would not involve any ground-disturbing activities, but would involve the use of helicopters to transport individual bears to release sites. The main effects to other species would be those associated with disturbance of helicopter use.

Federally Endangered and Threatened Species

Federally listed species in the North Cascades Ecosystem and effect determination for each alternative in the Grizzly Bear Restoration Plan/EIS.

Species	ESA Status	Alternative A	Alternative B	Alternative C	Alternative D
Gray Wolf	E	No Effect	MANLAA*	MANLAA	MANLAA
Grizzly Bear	T	No Effect	Beneficial Effect	Beneficial Effect	Beneficial Effect
Lynx	T	No Effect	MANLAA	MANLAA	MANLAA
Marbled Murrelet	T	No Effect	MANLAA	MANLAA	MANLAA
Northern Spotted Owl	T	No Effect	MANLAA	MANLAA	MANLAA
Bull trout	T	No Effect	MANLAA	MANLAA	MANLAA
Upper Columbia River Spring Chinook Salmon	E	No Effect	MANLAA	MANLAA	MANLAA
Puget Sound Chinook Salmon	T	No Effect	MANLAA	MANLAA	MANLAA
Puget sound Steelhead	T	No Effect	MANLAA	MANLAA	MANLAA
Middle Columbia River Steelhead	T	No Effect	MANLAA	MANLAA	MANLAA
Upper Columbia River Steelhead	T	No Effect	MANLAA	MANLAA	MANLAA

Species	ESA Status	Alternative A	Alternative B	Alternative C	Alternative D
Showy Stickseed	E	No Effect	No Effect	No Effect	No Effect
Water howellia	T	No Effect	No Effect	No Effect	No Effect
Wenatchee mtns checker-mallow	E	No Effect	No Effect	No Effect	No Effect
Ute ladies'-tresses	T	No Effect	No Effect	No Effect	No Effect

*MANLAA = may affect, not likely to adversely affect

Effects for certain species are elaborated on here using the language required for Forest Service analysis of threatened and endangered species.

Gray Wolf
Alternative A – No Effect
Alternatives B, C, and D - May Affect, Not Likely to Adversely Affect
The use of helicopters to transport grizzly bears from staging areas to release sites could disturb and/or displace gray wolves that might be in those areas. This effect would be temporary in nature and would be insignificant and discountable.

Grizzly Bear
Alternative A – No Effect
Alternatives B, C, and D – Beneficial Effect
The proposed project would lead to the recovery of the grizzly bear populations in the North Cascades Ecosystem and would contribute to the recovery of the species as a whole.

Canada Lynx
Alternative A – No Effect
Alternatives B, C, and D - May Affect, Not Likely to Adversely Affect
The use of helicopters to transport grizzly bears from staging areas to release sites could disturb and/or displace lynx that might be in those areas. Maternal den sites are used by female lynx with kittens from late May through late July. Helicopter disturbance of a den site could possibly result in abandonment of a den site and a higher risk of mortality for the kittens. Grizzly bear release sites would be in the center of meadows large enough for a helicopter to safely maneuver and land. Release sites would be selected to avoid those adjacent to special habitats such as lynx denning habitat. Thus it is unlikely that lynx would be disturbed by helicopter assisted grizzly bear releases. This effect would be temporary in nature and would be insignificant and discountable.

Marbled Murrelet
Alternative A – No Effect
Alternatives B, C, and D - May Affect, Not Likely to Adversely Affect
The use of helicopters to transport grizzly bears from staging areas to release sites could disturb and/or displace marbled murrelets that might be in those areas. Release sites would be selected to avoid those adjacent to special habitats such as marbled murrelet nesting habitat. Thus it is unlikely that marbled murrelets would be disturbed by helicopter assisted grizzly bear releases. This effect would be temporary in nature and would be insignificant and discountable.

Northern Spotted Owl
Alternative A – No Effect
Alternatives B, C, and D - May Affect, Not Likely to Adversely Affect

The use of helicopters to transport grizzly bears from staging areas to release sites could disturb and/or displace northern spotted owls that might be in those areas. Release sites would be selected to avoid those adjacent to special habitats such as northern spotted owl nesting habitat. Thus it is unlikely that northern spotted owls would be disturbed by helicopter assisted grizzly bear releases. This effect would be temporary in nature and would be insignificant and discountable.

Bull trout
Middle Columbia River Steelhead
Upper Columbia River Steelhead
Puget Sound Steelhead
Puget Sound Chinook Salmon
Upper Columbia River Spring Chinook Salmon
Alternative A – No Effect
Alternatives B, C, and D - May Affect, Not Likely to Adversely Affect
There would be a potential for grizzly bear predation on listed fish species, however the small number of bears in anticipated to be in the NCE makes this a low potential and the effect on fish species would be insignificant and discountable. See Chapter 4 in this Plan/EIS.

Showy Stickseed
Water howellia
Wenatchee mtns checker-mallow
Ute ladies'-tresses
Alternatives A, B, C, and D – No Effect
Grizzly bears do eat vegetation but primarily plants and plant parts that are high in nutritional value such as fruits, nuts, or bulbous roots. These species and grizzly bears coexisted in the past. The relatively rarity of these plant species and grizzly bears in the NCE make it unlikely that grizzly bears would encounter any of these plants.

Regional Forester Sensitive Species

Region 6 sensitive species in the North Cascades Ecosystem and impact determination for each alternative in this Grizzly Bear Restoration Plan/EIS.

Species	Alternative A	Alternative B	Alternative C	Alternative D
Northern goshawk	No Impact	No Impact	No Impact	No Impact
Gray flycatcher	No Impact	No Impact	No Impact	No Impact
American peregrine falcon	No Impact	No Impact	No Impact	No Impact
Common loon	No Impact	No Impact	No Impact	No Impact
Sandhill crane	No Impact	No Impact	No Impact	No Impact
Bald eagle	No Impact	No Impact	No Impact	No Impact
Harlequin duck	No Impact	No Impact	No Impact	No Impact
Lewis's woodpecker	No Impact	No Impact	No Impact	No Impact
White-headed woodpecker	No Impact	No Impact	No Impact	No Impact
Sharp-tailed grouse	No Impact	No Impact	No Impact	No Impact
Gray wolf	No Impact	MIIBNLPV*	MIIBNLPV	MIIBNLPV
Townsend's big-eared bat	No Impact	No Impact	No Impact	No Impact

Species	Alternative A	Alternative B	Alternative C	Alternative D
Wolverine	No Impact	MIIBNLPV	MIIBNLPV	MIIBNLPV
Little Brown myotis	No Impact	No Impact	No Impact	No Impact
Mountain goat	No Impact	No Impact	No Impact	No Impact
Rocky Mtn. bighorn sheep	No Impact	No Impact	No Impact	No Impact
California bighorn sheep	No Impact	No Impact	No Impact	No Impact
Pacific fisher	No Impact	No Impact	No Impact	No Impact
Western gray squirrel	No Impact	No Impact	No Impact	No Impact
Cascade red fox	No Impact	No Impact	No Impact	No Impact
Larch mountain salamander	No Impact	No Impact	No Impact	No Impact
Van dyke's salamander	No Impact	No Impact	No Impact	No Impact
Western pond turtle	No Impact	No Impact	No Impact	No Impact
Striped whipsnake	No Impact	No Impact	No Impact	No Impact
Giant palouse earthworm	No Impact	No Impact	No Impact	No Impact
Washington duskysnail*	No Impact	No Impact	No Impact	No Impact
Masked duskysnail*	No Impact	No Impact	No Impact	No Impact
Puget oregonian	No Impact	No Impact	No Impact	No Impact
Grand coulee mountainsnail	No Impact	No Impact	No Impact	No Impact
Chelan mountainsnail*	No Impact	No Impact	No Impact	No Impact
Shiny tightcoil	No Impact	No Impact	No Impact	No Impact
Broadwhorl tightcoil	No Impact	No Impact	No Impact	No Impact
Blue-gray tail-dropper	No Impact	No Impact	No Impact	No Impact
Western bumblebee	No Impact	No Impact	No Impact	No Impact
Astarte fritillary	No Impact	No Impact	No Impact	No Impact
Meadow fritillary	No Impact	No Impact	No Impact	No Impact
Freija fritillary	No Impact	No Impact	No Impact	No Impact
Labrador sulphur	No Impact	No Impact	No Impact	No Impact
Lustrous copper	No Impact	No Impact	No Impact	No Impact
Melissa arctic	No Impact	No Impact	No Impact	No Impact
Mardon skipper	No Impact	No Impact	No Impact	No Impact
Peck's skipper	No Impact	No Impact	No Impact	No Impact
Tawny-edged skipper	No Impact	No Impact	No Impact	No Impact
Great basin fritillary	No Impact	No Impact	No Impact	No Impact
Johnson's hairstreak	No Impact	No Impact	No Impact	No Impact
Zigzag darner	No Impact	No Impact	No Impact	No Impact
Subarctic darner	No Impact	No Impact	No Impact	No Impact
Subarctic bluet	No Impact	No Impact	No Impact	No Impact
Pacific lamprey	No Impact	MIIBNLPV	MIIBNLPV	MIIBNLPV

Species	Alternative A	Alternative B	Alternative C	Alternative D
Lake Chub	No Impact	MIIBNLPV	MIIBNLPV	MIIBNLPV
Westslope Cutthroat trout	No Impact	MIIBNLPV	MIIBNLPV	MIIBNLPV
Inland Columbia Basin redband trout	No Impact	MIIBNLPV	MIIBNLPV	MIIBNLPV
Pygmy whitefish	No Impact	MIIBNLPV	MIIBNLPV	MIIBNLPV
All Species of Sensitive Plants	No Impact	No Impact	No Impact	No Impact
All Survey and Manage Species	No Impact	No Impact	No Impact	No Impact

*MIIBNLPV = May impact individuals, but is not likely to cause a trend toward Federal listing or a loss of population viability.

The restoration of grizzly bears to the NCE would have no impact on most of the species listed on the Region 6 Regional Forester Sensitive Species list. Alternatives A, B, C, and D would have no impact on any of the bird, reptile, amphibian, plant, and invertebrate species listed.

The wolverine is a carnivorous scavenger that depends on other large predators to kill ungulates. It is possible that wolverines may interact with grizzly bears at an ungulate carcass or that grizzly bears would compete with wolverines for the same sources of carrion. Due to the small number of both bears and wolverines in the NCE, this potential interaction would be unlikely and insignificant. Alternative A would have no impact on wolverine. Alternatives B, C, and D may impact individuals but is not likely to cause a trend toward Federal listing or a loss of population viability.

There would be a potential for grizzly bear predation on listed fish species, however the small number of bears in anticipated to be in the NCE makes this a low potential and the effect on fish species would be insignificant and discountable. For the Pacific lamprey, lake chub, westslope cutthroat trout, inland Columbia basin redband trout, and pygmy white fish Alternative A would have no impact. Alternative B, C, and D may impact individuals but is not likely to cause a trend toward Federal listing or a loss of population viability. See chapter 4 in this plan/EIS.

Northwest Forest Plan Survey and Manage Species

The reintroduction of grizzly bears to the NCE would not involve any ground-disturbing activities and therefore each of the alternatives would have no effect on any survey and manage species.

Designated Critical Habitat for Federally Listed Species

The NCE contains designated critical habitat for lynx, northern spotted owl, and bull trout. The reintroduction of grizzly bears to the NCE would not involve any ground-disturbing activities and therefore each of the alternatives would have no effect on any designated critical habitat for federally listed species.

Forest Plan Management Indicator Species

Direction in the National Forest Management Act and in each of the Land and Resource Management Plans for the 3 National Forests in the NCE require the review of actions on National Forests to determine their effect to population viability of Management Indicator Species.

Forest Plan management indicator species in the North Cascades Ecosystem and effect determination for each alternative in the NCE Grizzly Bear Restoration Plan/EIS.

Species	Alternative A	Alternative B	Alternative C	
American marten	No Effect	No Effect	No Effect	No Effect
Bald Eagle	No Effect	No Effect	No Effect	No Effect
Barred Owl	No Effect	No Effect	No Effect	No Effect
Beaver	No Effect	No Effect	No Effect	No Effect
Gray Wolf	No Effect	WNCTNTV*	WNCTNTV	WNCTNTV
Grizzly Bear	No Effect	Beneficial Effect	Beneficial Effect	Beneficial Effect
Lynx	No Effect	WNCTNTV	WNCTNTV	WNCTNTV
Mountain Goat	No Effect	No Effect	No Effect	No Effect
Mule Deer	No Effect	WNCTNTV	WNCTNTV	WNCTNTV
Northern Spotted Owl	No Effect	No Effect	No Effect	No Effect
Peregrine Falcon	No Effect	No Effect	No Effect	No Effect
Pileated Woodpecker	No Effect	No Effect	No Effect	No Effect
Primary Cavity Excavators	No Effect	No Effect	No Effect	No Effect
Rocky Mountain Elk	No Effect	WNCTNTV	WNCTNTV	WNCTNTV
Ruffed Grouse	No Effect	No Effect	No Effect	No Effect
Three-toed woodpecker	No Effect	No Effect	No Effect	No Effect

*WNCTNTV = Would not contribute toward a negative trend in viability.

The effects of each alternative on ungulate species (MIS species Mule Deer and Rocky Mountain Elk) is evaluated in Chapter 4 of this Plan/EIS.

Compliance with USFS Statutes, Policies, and Plans by Alternative

Each of the 4 alternatives are compliant with all of the policies, directives and Forest Plan goals, standards, and guidelines that require the use of the NEPA process and coordination with other agencies, organizations, and Native American tribal groups. The North Cascades Ecosystem Grizzly Bear Restoration Plan/EIS does follow the NEPA process, and coordination with other agencies, organizations and Native American tribal groups has occurred.

This analysis conforms to the requirements of *Pacific Northwest Invasive Plant Program Final Environmental Impact Statement, Record of Decision* (USDA-FS November 2005). This project is intended to comply with the *Guide to Noxious Weed Prevention Practices (USDA-FS 2001)* supporting the February 3, 1999 Executive Order on Invasive Species, and the *National Strategy and Implementation Plan for Invasive Species Management* (USDA-FS October 2004).

Alternative A: Continuation of Existing Grizzly Bear Management (No Action)

Under Alternative A, grizzly bears would not be moved and released into the US portion of the NCE. The tentative restoration goal of 200 grizzly bears in the US portion of the NCE would not likely be achieved under alternative A.

Alternative A would be compliant with:

- The Endangered Species Act provisions for the Forest Service, Forest Service Manual 2670 policies and directives for Federally threatened and endangered species, and all Forest Plan goals, standards, and guidelines regarding Federally threatened and endangered species. Alternative A would have *no effect* on any species Federally listed as threatened or endangered.

- Forest Service Manual 2670 direction for sensitive species. Alternative A would have *no impact* on any of the species listed as sensitive by the Regional Forester.

- The National Forest Management Act and Forest Plan direction for Management Indicator Species. Alternative A would have no effect on any of the management indicator species listed for the 3 National Forests in the North Cascades Ecosystem.

- The Wilderness Act and all Forest Plan goals, standards, and guidelines regarding wilderness. Alternative A would result in no actions being taken in Forest Service wilderness.

- The Wild and Scenic Rivers Act. Alternative A would not result in any reintroductions and would have no effect on the Outstandingly Remarkable Values of any of the Wild and Scenic Rivers in the North Cascades Ecosystem.

- All Forest Plan standards, and guidelines regarding disturbance to nesting and roosting sites, calving/fawning/kidding areas, and big game wintering areas. Alternative A would result in no actions taken that could cause a disturbance to any of these area.

- The Forest Plan standard regarding Research Natural Areas. Alternative A would result in no reintroduction of native species.

Forest Plan Consistency

The No Action alternative would meet the Mt. Baker-Snoqualmie, Okanogan, and Wenatchee Forest Plan standards and guidelines for fish, wildlife, and vegetation and would therefore be consistent with the Mt. Baker-Snoqualmie, Okanogan, and Wenatchee Forest Plans (USDA 1989 1990a, 1990b), as amended.

Alternative B: Ecosystem Evaluation Restoration
Alternative C: Incremental Restoration
Alternative D: Expedited Restoration
Under Alternatives B, C, and D, grizzly bears would be moved and released into the U.S. portion of the NCE. The tentative restoration goal of 200 grizzly bears in the U.S. portion of the NCE would be achieved at a different rate under each of the alternatives. Grizzly bear releases would include the use of helicopter and potential release sites in each of the 3 alternatives would include wilderness sites.

Alternatives B, C, and D would be compliant with:

- The Endangered Species Act provisions for the Forest Service, Forest Service Manual 2670 policies and directives for Federally threatened and endangered species, and all Forest Plan goals, standards, and guidelines regarding Federally threatened and endangered species. Alternatives B, C, and D would all either have *no effect* determination or *may affect, not likely to adversely affect* determinations on species Federally listed as threatened or endangered. The *may affect, not likely to adversely affect* determinations have been consulted on and concurred with by the U. S. Fish and Wildlife Service.

- Forest Service Manual 2670 direction for sensitive species. Alternatives B, C, and D would have either a no impact determination or a *may impact individuals, but is not likely to cause a trend toward Federal listing or a loss of population viability* determination on the species listed as sensitive by the Regional Forester.

- The National Forest Management Act and Forest Plan direction for Management Indicator Species. Alternatives B, C, and D would have either *no effect* or *would not contribute toward a negative trend in viability* for the management indicator species listed for the 3 National Forests in the North Cascades Ecosystem.

- The Wilderness Act and all Forest Plan goals, standards, and guidelines regarding wilderness. Alternatives B, C, and D would result in helicopter use in Forest Service wilderness. Motorized equipment use is permissible when determined to be needed to meet the minimum requirements for a significant administrative purpose. The need for helicopters to be used in this plan/EIS was considered in the Minimum Requirements Decision Guide in Appendix B of this EIS.

- The Wild and Scenic Rivers Act. Alternatives B, C, and D would result in the release of grizzly bears but would have no effect on the Outstandingly Remarkable Values of any of the Wild and Scenic Rivers in the North Cascades Ecosystem.

- All Forest Plan standards, and guidelines regarding disturbance to nesting and roosting sites, calving/fawning/kidding areas, and big game wintering areas. Alternatives B, C, and D would result in the release of grizzly bears but the proposed timing of the releases and the selection of the staging areas/release sites would prevent disturbance to any of these areas.

- The Forest Plan standard regarding Research Natural Areas. Alternatives B, C, and D would result in release of a native species grizzly bears), but this would not prevent the goals of any RNA from being met.

Forest Plan Consistency

All action alternatives would meet the Mt. Baker-Snoqualmie, Okanogan, and Wenatchee Forest Plan standards and guidelines for fish, wildlife, and vegetation and would therefore be consistent with the Mt. Baker-Snoqualmie, Okanogan, and Wenatchee Forest Plans (USDA 1989 1990a, 1990b), as amended.

APPENDIX C: FRAMEWORK OF RELEVANT FEDERAL AND STATE LAWS, POLICIES, AND PLANS

FRAMEWORK OF RELEVANT FEDERAL AND STATE LAWS, POLICIES, AND PLANS

FEDERAL LAWS AND REGULATIONS

1. *Endangered Species Act* (ESA)

As noted in chapter 1, the purpose of the ESA (16 USC 1531 et seq.) is to protect and recover imperiled species and the ecosystems upon which they depend. The US Fish and Wildlife Service (FWS) recently reaffirmed (78 Fed. Reg. 70104 [Nov. 22, 2013]) that the North Cascades Ecosystem (NCE) grizzly bear population, currently listed under the ESA as threatened, is warranted for uplisting from threatened to endangered status under the ESA, but that uplisting is precluded by higher-priority listings. While the actions described in the action alternatives are not by themselves expected to lead directly to delisting of the grizzly bear in the NCE, part of the need for this *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (plan/EIS) is to support the recovery of the grizzly bear to the point where it can be removed from the federal list of threatened and endangered wildlife species. The potential designation of grizzly bears in the NCE as a non-essential experimental population under section 10(j) of the ESA is intended to aid in this effort by providing managers with additional flexibility. Additional detail on the delisting process and section 10(j) is provided below.

Delisting of a Species under the ESA

Delisting of a species under the ESA is an extensive process that requires a finding of fact by FWS based on an assessment of the population by experts both inside and outside the agency that takes into account five factors:

- Is there a present or threatened destruction, modification, or curtailment of species' habitat or range?
- Is the species subject to overutilization for commercial, recreational, scientific, or educational purposes?
- Is disease or predation a factor?
- Are there inadequate existing regulatory mechanisms in place outside the ESA (taking into account the efforts by the States and other organizations to protect the species or habitat)?
- Are other natural or manmade factors affecting its continued existence?

If the FWS determines that the threats have been sufficiently reduced, the agency may consider delisting. When delisting a species, FWS first proposes the action in the Federal Register. At this time, FWS also seeks the opinion of independent species experts, other federal agencies, state biologists, and the public. After analyzing the comments received on the proposed rulemaking, FWS decides whether to complete the delisting (FWS 2002).

Section 10(j) Experimental Population

Section 10 of the ESA, entitled “Exceptions,” offers an avenue to authorize activities that would otherwise be prohibited. To relieve concern that reintroductions of ESA-listed species may result in

restrictions on the use of private, tribal, or public land, Congress added the provision for experimental populations under section 10(j) in a 1982 amendment to the ESA. Section 10(j) provides for the reintroduction of experimental populations under special regulations. Prior to addition of section 10(j), the FWS had authority to introduce threatened and endangered species into unoccupied historic range, but such efforts were often met with resistance. One reason for public resistance was that the FWS could not assure private landowners, other federal agencies, and state and local governments that a transplanted population would not disrupt future land management options. Under section 10(j), the Secretary of the Department of the Interior can designate reintroduced populations established outside the species' current range, but within its historical range, as "experimental." An experimental population is a group of reintroduced plants or animals that is geographically isolated from other populations of the species and is typically not considered essential to the survival of the species as a whole. Experimental populations are afforded additional regulatory flexibility regarding management of the species.

2. *Wilderness Act of 1964*

With the signing of the *Wilderness Act* by President Lyndon B. Johnson on September 3, 1964, the National Wilderness Preservation System was established to "secure for the American people of present and future generations the benefits of an enduring resource of wilderness."

The *Wilderness Act* states, "In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." Although there is great similarity between the National Park Service (NPS) *Organic Act* and the *Wilderness Act*, Congress applied the *Wilderness Act* to the NPS to strengthen its protective capabilities.

Under the *Wilderness Act*, the park must apply the "minimum requirement" concept to all management activities that affect the wilderness resource and character at the park. "Minimum requirement" is a documented process used to determine the appropriateness of all actions affecting wilderness. This concept is intended to minimize impacts on wilderness values and resources. Managers may authorize (using a documented process) the generally prohibited activities or uses listed in section 4(c) of the *Wilderness Act*, if deemed necessary to meet the minimum requirements for the administration of the area as wilderness and where those methods are determined to be the "minimum tool" for the project. An analysis of helicopter use as the minimum tool to be used for the release of grizzly bears into wilderness in the NCE is included in appendix F.

3. North Cascades National Park Enabling Legislation

President Lyndon B. Johnson signed the enabling legislation for North Cascades National Park into law on October 2, 1968, establishing North Cascades National Park and Ross Lake and Lake Chelan NRAs (16 USC 1 § 90 – 90e-3). The enabling legislation's statement of purpose states that the park is established to:

> *…preserve for the benefit, use, and inspiration of present and future generations certain majestic mountain scenery, snowfields, glaciers, alpine meadows, and other unique natural features in the North Cascade Mountains of the State of Washington…*

and to

> *…provide for the public outdoor recreation use and enjoyment … [and] for the conservation of the scenic, scientific, historic, and other values contributing to public enjoyment of such lands and waters…*

The purposes of the two national recreation areas are to complement North Cascades National Park and conserve the scenic, natural and cultural values of the Upper Skagit River Valley, the Lower Stehekin Valley, Lake Chelan, and the surrounding wilderness for outdoor recreation and education, while respecting the remote Stehekin community and the hydroelectric reservoirs and development on Ross Lake (NPS 2012).

4. NPS Regulations for Food Storage

Title 36, Code of Federal Regulations (CFR) is the principal set of rules and regulations governing federal agencies of the United States with respect to parks, forests, and public lands.

Title 36, CFR, chapter 1, section 2.10(d) contains NPS regulations for proper food storage and prohibits anyone from leaving food unattended or stored improperly where it could attract or otherwise be available to wildlife, stating:

> *The superintendent may designate all or a portion of a park area where food, lawfully taken fish or wildlife, garbage, and equipment used to cook or store food must be kept sealed in a vehicle, or in a camping unit that is constructed of solid, non-pliable material, or suspended at least 10 feet above the ground and 4 feet horizontally from a post, tree trunk, or other object, or shall be stored as otherwise designated. Violation of this restriction is prohibited.*

Title 36, CFR, chapter 1, section 2.14(a) contains NPS regulations governing proper disposal of waste and prohibits the disposal of refuse in other than refuse receptacles, stating:

> *The following are prohibited: (1) Disposing of refuse in other than refuse receptacles. (2) Using government refuse receptacles or other refuse facilities for dumping household, commercial, or industrial refuse, brought as such from private or municipal property, except in accordance with conditions established by the superintendent. (3) Depositing refuse in the plumbing fixtures or vaults of a toilet facility. (4) Draining refuse from a trailer or other vehicle, except in facilities provided for such purpose. (5) Bathing, or washing food, clothing, dishes, or other property at public water outlets, fixtures or pools, except at those designated for such purpose. (6) Polluting or contaminating park area waters or water courses. (7) Disposing of fish remains on land, or in waters within 200 feet of boat docks or designated swimming beaches, or within developed areas, except as otherwise designated. (8) In developed areas, the disposal of human body waste, except at designated locations or in fixtures provided for that purpose. (9) In nondeveloped areas, the disposal of human body waste within 100 feet of a water source, high water mark of a body of water, or a campsite, or within sight of a trail, except as otherwise designated.*

NATIONAL PARK SERVICE MANAGEMENT POLICIES 2006

Chapter 4 of the *National Park Service Management Policies 2006* (NPS 2006), "Natural Resource Management," provides direction regarding the implementation of NPS activities to further the purposes of the ESA:

> *The Service manages the natural resources of parks to maintain them in an unimpaired condition for present and future generations in accordance with … environmental laws such as the … Endangered Species Act of 1973 …*

The NPS *Management Policies 2006* states that whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species; however, the Service may intervene to manage individuals or populations in order to protect rare, threatened, or endangered species.

Section 4.4.2.2, Restoration of Native Plant and Animal Species, states,

> *The Service will strive to restore extirpated native plant and animal species to parks whenever all of the following criteria are met:*
>
> - *Adequate habitat to support the species either exists or can reasonably be restored in the park and if necessary also on adjacent public lands and waters; once a natural population level is achieved, the population can be self- perpetuating.*
> - *The species does not, based on an effective management plan, pose a serious threat to the safety of people in parks, park resources, or persons or property within or outside park boundaries.*
> - *The genetic type used in restoration most nearly approximates the extirpated genetic type.*
> - *The species disappeared or was substantially diminished as a direct or indirect result of human-induced change to the species population or to the ecosystem.*
> - *Potential impacts upon park management and use have been carefully considered.*

Section 4.4.2.3 Management of Threatened or Endangered Plants and Animals, states,

> *the Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species.*

To meet these obligations, it is NPS policy to cooperate with FWS to

- ensure NPS actions comply with the ESA;
- undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats;
- manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species;

- cooperate with other agencies to ensure that delineation of critical habitat, essential habitat, and/or recovery areas on park lands provides needed conservation benefits to recovery efforts being conducted by all the participating agencies;
- participate in the recovery planning process, including the provision of members on recovery teams and recovery implementation teams where appropriate;
- cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species; and
- conduct actions and allocate funding to address endangered, threatened, proposed, and candidate species.

U.S. FOREST SERVICE STATUTES, POLICIES, AND PLANS PERTINENT TO THE NCE GRIZZLY BEAR RESTORATION PLAN

A summary of the statutes, policies and plans that direct and guide management on the Mt. Baker-Snoqualmie and Okanogan-Wenatchee National Forests. The statutes, policies and plans summarized below are only those that are applicable to grizzly bear restoration activities proposed in this EIS/Plan.

Laws

Endangered Species Act.

Section 5 of the Act directs the Secretary of Agriculture to "establish and implement a program to conserve fish, wildlife, and plants," including federally listed species.

National Forest Management Act.
Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area.

In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species. . . . . because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality.

Wilderness Act.
Fish and wildlife management activities in wilderness will be planned and implemented in conformance with the Act's purpose of securing an "enduring resource of wilderness" for the American people. Reintroductions of wildlife species should only occur if the species was once indigenous to an area and was extirpated by human induced events, and then shall be made in a manner compatible with the wilderness environment.

Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and except as necessary to meet minimum requirements for the administration of the area for the purposed of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

Wild and Scenic Rivers Act.
Potential impacts of transplants and reintroductions on fish and wildlife populations on the Outstandingly Remarkable Values of any Wild or Scenic river should be considered.

Policy and Directives

- U.S. Department of Agriculture Departmental Regulation 9500-4 directs the Forest Service to:
    - Manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species."
    - Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."
    - Avoid actions "which may cause a species to become threatened or endangered."

- Forest Service Manual 2670.21 – Threatened and Endangered Species includes:
    - Manage National Forest System habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary.

- Forest Service Manual 2670.31 – Threatened and Endangered Species
    - Place top priority on conservation and recovery of endangered, threatened, and proposed species and their habitats through relevant National Forest System, State and Private Forestry, and Research and Development activities and programs.
    - Review, through the biological evaluation process, actions and programs authorized, funded, or carried out by the Forest Service to determine their potential for effect on threatened and endangered species and species proposed for listing.

- Forest Service Manual 2670.32 - Sensitive Species
    - Review programs and activities as part of the National Environmental Policy Act of 1969 process through a biological evaluation, to determine their potential effect on sensitive species.

- Forest Service Manual 2670.44 – Regional Foresters
    - 14. Approve the introduction or translocation of any federally listed species on National
    - Forest System lands.

- Forest Service Manual 2673.5 – Translocation
    - Translocation to achieve recovery objectives of listed species may be desirable to meet purposes of the Endangered Species Act.

- Forest Service Manual 2674 – Reintroduction
    - The Forest Service shall encourage the reintroduction of listed wildlife, fish, and plants on to suitable unoccupied habitat when such actions promote recovery of the species.

- Forest Service Manual 2676.13
    - Cooperate with state agencies, the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, and other agencies and groups to carry out active programs to conserve the grizzly bear over the long term.

National Forest Land and Resource Management Plans

This EIS is tiered to the Final Environmental Impact Statement for the Mt. Baker-Snoqualmie National Forest Land and Resource Management Plan, as amended (USDA Forest Service 1990), the Final Environmental Impact Statement for the Okanogan National Forest Land and Resource Management Plan, as amended (USDA Forest Service 1989), and the Final Environmental Impact Statement for the Wenatchee National Forest Land and Resource Management Plan, as amended (USDA Forest Service 1990). Site-specific objectives and guidelines are identified in each of these 3 Forest Plans. Amendments to these 3 Forest Plans include standards and guidelines described in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan; USDA Forest Service and USDI Bureau of Land Management 1994). Key elements of the Northwest Forest Plan include the establishment of Late Successional Reserves to help protect and enhance late successional habitats, and the establishment of Riparian Reserves and the Aquatic Conservation Strategy to help protect and enhance riparian and aquatic habitats. The 3 Forest Plans were also amended with the *Pacific Northwest Invasive Plant Program Final Environmental Impact Statement, Record of Decision* (USDA-FS November 2005) which includes direction from the *Guide to Noxious Weed Prevention Practices (USDA-FS 2001)* supporting the February 3, 1999 Executive Order on Invasive Species, and the *National Strategy and Implementation Plan for Invasive Species Management* (USDA-FS October 2004).
The current Forest Plans for the Mount Baker-Snoqualmie, Okanogan, and Wenatchee National Forests were written prior to the North Cascades Ecosystem being designated as a grizzly bear recovery zone in 1991 and thus include no direction specific to grizzly bear recovery. In 1997 the Forest Supervisors of these 3 National Forests agreed to and established an "interim standard" until superseded by a Forest Plan amendment or revision. This interim standard included:

- No net loss of existing core area within any Bear Management Unit (BMU), with core area defined as area >0.3 miles from any open motorized access route or high use nonmotorized access route.

This interim standard is still in place and will be until the current Forest Plans are revised.

Forest Management Goals and Forest-wide Standards and Guidelines

Land and Resource Management Plan goals, standards and guidelines relevant to the proposed grizzly bear restoration activities are listed below for each Forest.

<u>Mt Baker-Snoqualmie National Forest</u>

Forest Management Goals:

- Wilderness 1. Manage wilderness for the use and enjoyment of people in such a manner as will leave wilderness values unimpaired for future.

- Wildlife and Fish 1. Maintain the vitality, distribution and abundance of animal populations. At a minimum, maintain viable populations of existing native and desired non-native vertebrate species on National Forest lands. No species should be eliminated from an area. Maintain the long term productivity of wildlife habitats.

- Wildlife and Fish 2. Identify threatened, endangered, and sensitive plant and animal species habitat. Protect, maintain and/or enhance this habitat in accordance with Recovery Plans. The overall goal is to prevent the Federal listing of Sensitive species and/or, to pursue the delisting of Federally listed species. Develop management guides for T & E species which carry out these goals.

- Long term Productivity and Diversity 1. Maintain native and desirable non-native plant and animal species and communities.

Forest Wide Standards and Guidelines:

- General Procedures 1. Activities affecting forest system lands and resources will be analyzed through NEPA analysis.

- General Procedures 4. Management of forest system lands, resources, and activities will be coordinated with appropriate local, State, Federal agencies, private landowners, Indian tribes, and interest and user groups.

- American Indian Religious and Cultural Uses 6. Present information about planned project activities in all management areas to religious and political leaders of tribal groups whose traditional practices might be affected.

- Wilderness – Fish and Wildlife 3. Native species shall be maintained, with special emphasis on the preservation of threatened or endangered species, plus designated management indicator species and their habitats. Fish or wildlife indigenous to an area, may be re-established if previously eliminated by the influence of man.

- Wilderness – Aircraft 3. The landing of aircraft within the wilderness is prohibited. Air dropping supplies is also prohibited. Exceptions may be granted for emergencies, significant administrative purposes, and fish stocking.

- Wildlife Habitat Management 3. Nest sites actively being used by raptors or other bird species of special concern (i.e., great blue heron) will be protected from human disturbance until nesting and fledging is completed.

- Wildlife Habitat Management 5. Programmed activities in calving, fawning, and kidding areas should be discouraged. They shall be timed to minimize disturbance to the animals. This may require restricting access and operations during certain times of the year.

- Threatened, Endangered, and Sensitive Species 1. All proposed management actions which have the potential to affect habitat of endangered, threatened, or sensitive species will be evaluated to determine if any of these species are present. Biological evaluations will be completed for all proposed management activities which could affect T & E species.

<u>Okanogan National Forest</u>

Forest Wide Standards and Guidelines:

- Management 1-1. Appropriate public involvement activities shall be conducted for the purposes of gaining information regarding the land and resource base upon which management decisions are made; to insure the Forest Service understands public needs, concerns, and values, and to inform the public of Forest Service management activities associated with implementing this Forest Plan.

- Management 1-2. Appropriate coordination with other federal agencies, state and local governments, and Native American tribes shall occur on an ongoing basis in the planning, designing, executing, and monitoring of projects associated with implementing the Forest Plan.

- Wildlife 6-8. Manage disturbing activities so they occur outside of critical periods to protect wildlife (e.g., identified parturition areas, nesting sites, wintering areas).

- Wildlife 6-11. Raptor nest sites should be protected; during the active nest season certain project activities may be limited.

- Wildlife 6-17. Threatened and endangered species shall be managed according to recovery plans. Coordinate management with U. S. Fish & Wildlife Service and Washington Dept. of Fish and Wildlife.

- Wildlife 6-18. Consultation with U. S. Fish & Wildlife Service shall be initiated when threatened or endangered species may be affected by resource proposals.

- Research Natural Areas 8-6B. Reintroduction of native species may be permitted as long as the goals of the RNA are met.

- Wilderness 15A-6A and 15B-6A. Fish and wildlife indigenous to the wilderness shall be maintained with emphasis on threatened and endangered species.

<u>Wenatchee National Forest</u>

Forest Management Goals:

- Wilderness – Manage designated wilderness to perpetuate wilderness character, natural ecologic processes, and to provide outdoor recreation opportunities appropriated in wilderness.

- Wildlife, Fish, and Sensitive Plants – Manage critical wildlife habitat to improve the status of threatened and endangered species to a point where they no longer need protection under the Endangered Species Act of 1973.

Forest Wide Standards and Guidelines:

- Proposed, Threatened, Endangered, or Sensitive Species -1. Threatened, endangered, and sensitive species will be identified and managed in cooperation with the USDI Fish and Wildlife Service and Washington Department of Wildlife.

- Proposed, Threatened, Endangered, or Sensitive Species -5. All Project Environmental Analyses will evaluate the effects of the project on threatened, endangered, and sensitive species.

- Proposed, Threatened, Endangered, or Sensitive Species –Grizzly Bear - 3. If resident grizzly bears are discovered, cooperate with the USDI Fish and Wildlife Service and Washington Department of Wildlife to appropriately manage the animals.

- Wildlife and Fisheries – 3B. To maintain viable populations of raptors, protect all active nest and roost sites.

- Wildlife and Fisheries – Big Game Management - 13. Discourage activities in key mountain goat winter and kidding range from Dec. 1 until July 1.

STATE OF WASHINGTON LAWS AND REGULATIONS

In addition to the laws discussed above governing food storage and waste disposal on NPS lands, Washington state law contains two separate statutes governing proper sanitation with respect to large wild carnivores, which would extend to management of grizzly bears. Revised Code of Washington (RCW) chapter 77.15.792, Intentionally feeding or attempting to feed large wild carnivores or intentionally attracting large wild carnivores to land or a building- Penalty, states,

> *(1) A person may not intentionally feed or attempt to feed large wild carnivores or intentionally attract large wild carnivores to land or a building. (2) A person who intentionally feeds, attempts to feed, or attracts large wild carnivores to land or a building is guilty of a misdemeanor. (3) A person who is issued an infraction under RCW 77.15.790 for negligently feeding, attempting to feed, or attracting large wild carnivores to land or a building, and who fails to contain, move, or remove the food, food waste, or other substance within twenty-four hours of being issued the infraction, is guilty of a misdemeanor.*

RCW chapter 77.15.790 Negligently feeding, attempting to feed, or attracting large wild carnivores to land or a building—Infraction, states,

> *(1) A person may not negligently feed or attempt to feed large wild carnivores or negligently attract large wild carnivores to land or a building. (2) If a fish and wildlife officer, ex officio fish and wildlife officer, or animal control authority, as defined in RCW 16.30.010, has probable cause to believe that a person is negligently feeding, attempting to feed, or attracting large wild carnivores to land or a building by placing or locating food, food waste, or other substance in, on, or about any land or building, and the food, food waste, or other substance poses a risk to the safety of any person, livestock, or pet because it is attracting or could attract large wild carnivores to the land or building, that person commits an infraction under chapter 7.84 RCW. (3) Subsection (2) of this section does not apply to: (a) A person who is engaging in forest practices in accordance with chapter 76.09 RCW or in hunting or trapping wildlife in accordance with all other applicable provisions of this title or rules of the commission or the director; (b) A person who is engaging in a farming or ranching operation that is using generally accepted farming or ranching practices consistent with Titles 15 and 16 RCW; (c) Waste disposal facilities that are operating in accordance with applicable federal, state, and municipal laws; (d) Entities listed in RCW 16.30.020(1) (a) through (j) and scientific collection permit holders; or (e) A fish and wildlife officer or employee or agent of the department operating under the authority of or upon request from an officer conducting authorized wildlife capture activities to address a threat to human safety or a wildlife interaction as*

defined in RCW 77.36.010. (4) For persons and entities listed in subsection (3) of this section, a fish and wildlife officer, ex officio fish and wildlife officer, or animal control authority, as defined in RCW 16.30.010, may issue a written warning to the person or entity if: (a) The officer or animal control authority can articulate facts to support that the person or entity has placed or is responsible for placing food, food waste, or other substance in, on, or about the person's or entity's land or buildings; and (b) The food, food waste, or other substance poses a risk to the safety of any person, livestock, or pet because the food, food waste, or other substance is attracting or could attract large wild carnivores to the land or buildings. (5)(a) Any written warning issued under subsection (4) of this section requires the person or entity placing or otherwise responsible for placing the food, food waste, or other substance to contain, move, or remove that food, food waste, or other substance within two days. (b) If a person who is issued a written warning under (a) of this subsection fails to contain, move, or remove the food, food waste, or other substance as directed, the person commits an infraction under chapter 7.84 RCW.

REFERENCES

National Park Service

2006 NPS *Management Policies 2006*.

2012 North Cascades National Park Complex Foundation Document. June, 2012.

US Fish and Wildlife Service (FWS)

2002 Delisting a Species: Section 4 of the Endangered Species Act. Obtained from FWS Endangered Species Program website, accessed July 27, 2016 at https://www.fws.gov/pacific/ecoservices/endangered/classification/pdf/delisting.pdf.

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APPENDIX D: IMPLEMENTATION COSTS

IMPLEMENTATION COSTS

Although some expenses may not necessarily be incurred annually and some expenses could change from year to year, the estimated average annual costs for grizzly bear restoration, based on input from the interdisciplinary team, are shown in table D-1. These costs would be primarily for sanitation and human-bear conflict mitigation efforts; monitoring for grizzly bear presence and the compilation of a dataset to track population growth; public outreach and education efforts; and maintenance of a grizzly bear sighting database. Some costs would also be incurred through participation in the Interagency Grizzly Bear Committee (IGBC).

TABLE D-1. ESTIMATED AVERAGE ANNUAL COSTS ASSOCIATED WITH THE NO-ACTION ALTERNATIVE

Management Action	National Park Service	US Fish and Wildlife Service	US Forest Service	Washington Department of Fish and Wildlife	Total
IGBC participation	$16,000	$20,000	$7,000	$7,000	$45,000
Sanitation	$10,000[a]	0	$5,000	0	$15,000
Education/interpretation	$7,400	0	$2,000	$2,500	$11,900
Monitoring	0	0	$6,000	$2,000	$8,000
Endangered Species Act (ESA) consultation and compliance	$3,000	0[b]	$8,000	0	$11,000
TOTAL	$36,400	$20,000	$28,000	$6,500	$90,900

NOTE: All costs include staff time, except sanitation costs.

[a] Costs are not annual, but project based: value provided is approximate annual cost based on average across 5 years.

[b] ESA consultation includes writing biological assessments and other time, but no costs were identified as solely dedicated to grizzly bears.

APPROXIMATE COSTS FOR ACTION ALTERNATIVES

Table D-2 provides general costs for implementing any of the action alternatives. Costs are either represented as per grizzly bear or per year. Table D-3 presents a comparison of the anticipated costs among the action alternatives over a period of 25 years.

TABLE D-2. APPROXIMATE GENERAL COSTS FOR GRIZZLY BEAR RESTORATION ACTION ALTERNATIVES

Management Action	Cost
Capture, transport, and release	$10,000 per grizzly bear
Monitoring (including equipment)	$7,000–$10,000 over 3 years per grizzly bear
Personnel	$120,000 per year
Education and interpretation	$10,000–$15,000 per year over no-action alternative
Sanitation	Same as no-action alternative
IGBC participation	Same as no-action alternative

Management Action	Cost
ESA consultation	[Assume same as no-action alternative]
Conflict Grizzly Bear Management • WDFW Conflict Response Law Enforcement • WDFW Preventative Measures and Investigations • Livestock Damage Preventative Cooperative Measures • Grizzly Bear Depredation Compensation	• 1 FTE (Approximately $117,000 per year) • 1 FTE (Approximately $122,000 per year) • Cost-share with landowners • Dependent on funding NOTE: It is unlikely given the proposed rate of releases and population levels of grizzly bears that these costs would be incurred in the near term. Rather these costs reflect the long term management of grizzly bears in the NCE.

TABLE D-3. APPROXIMATE GENERAL COSTS FOR GRIZZLY BEAR RESTORATION ACTION ALTERNATIVES

Management Action	Initial Restoration			Adaptive Phase (at 25 Years)		
	Alternative B (7 years)[a]	Alternative C (5 years)[d]	Alternative D (25 years)	Alternative B (18 years)	Alternative C (20 years)	Alternative D (N/A)
Capture and release[b,c]	$340,000	$340,000	$1,550,000–$1,680,000	TBD	TBD	N/A
Monitoring (including equipment)	$238,000–$340,000	$238,000–$340,000	$1,085,000–$1,680,000	TBD	TBD	N/A
Personnel	$840,000	$600,000	$3,000,000	$2,160,000	$2,400,000	N/A
Education/ interpretation	$139,300–$174,300	$99,500–$124,500	$497,500–$622,500	$358,200–$448,200	$398,000–$498,000	N/A
Sanitation	$105,000	$75,000	$375,000	$270,000	300,000	N/A
IGBC participation	$308,000	$220,000	$1,100,000	$792,000	880,000	N/A
ESA consultation and compliance	$21,000	$15,000	$75,000	$54,000	$60,000	N/A
Subtotal	$1,991,300–$2,128,300	$1,587,500–$1,714,500	$7,682,000–$8,532,500	$3,634,200–$3,724,200	$4,038,000–$4,138,000	N/A
Total	$1,991,300–$2,128,300	$1,587,500–1,714,500	$7,682,000–$8,532,500	$5,625,500–$5,852,500	$5,625,500–$5,852,500	N/A

[a] Assumes 7-year initial restoration period for alternative B based on 2 years of monitoring and subsequent default to alternative C.

[b] Assumes capture and release of 34 bears under alternatives B and C, due to replacement for mortality and emigration.

[c] Assumes capture and release of between 155 and 168 bears over 25 years under alternative D, factoring in mortality, emigration, and reproduction.

[d] Assumes an initial restoration period of 5 years to provide an estimate of cost, though these costs could be spread out over 10 years.

APPENDIX E: 2002 INTERAGENCY GRIZZLY BEAR COMMITTEE GUIDELINES FOR THE NORTH CASCADES ECOSYSTEM

2002 Interagency Grizzly Bear Committee

PLAN FOR DETERMINING GRIZZLY BEAR NUISANCE STATUS AND FOR CONTROLLING NUISANCE GRIZZLY BEARS FOR THE NCE

I. Preamble

THE INTERAGENCY GRIZZLY BEAR COMMITTEE RECOGNIZES THAT:

WHEREAS, it is mutually recognized that it is necessary to:

A. Comply with Section 7 of the Endangered Species Act which requires Federal agencies to protect the grizzly bear (Ursus arctos horribilis), a threatened species, and its habitat.

B. Comply with Fish and Wildlife Service rules and regulations relating to the removal of nuisance bears (FEDERAL REGISTER, Vol. 40, No. 145 - Monday, July 28, 1975).

C. Comply with Fish and Wildlife Service rules and regulations relating to interagency cooperation under the Endangered Species Act with emphasis on formal consultation related to management actions affecting grizzly bears (FEDERAL REGISTER, Vol. 43, No. 2 - Wednesday, January 24, 1978).

D. Identify the responsibilities of the respective agencies for determining grizzly bear nuisance status and for controlling nuisance grizzly bears.

E. Provide a mutually developed and mutually acceptable plan which contains a uniform interagency approach for management of grizzly bears and their habitat and for determining grizzly bear nuisance status and for controlling nuisance grizzlies.

F. Provide for an Aggregate Consultation on all management actions related to grizzly bears specified in the IGBC Guidelines, including nuisance bear control measures.

NOW, THEREFORE, in consideration of the above premises, the parties hereto agree as follows:

A. To accept the "Guidelines" as the primary source for management decisions involving grizzly bears and their habitat and not to determine grizzly bear nuisance status or control nuisance bears without assistance of other appropriate parties to the agreement.

B. The Forest Service, as the public land administering agency on National Forests, shall:

Coordinate all actions and participate in decisions relating to the determination of grizzly bear nuisance status and controlling nuisance grizzly bears on National Forest lands. Coordination means requesting assistance and participation of the Fish and Wildlife Service, the Departments, and, in some cases, the Park Service.

C. The Fish and Wildlife Service, as advisor to the Federal land management agencies in matters pertaining to fish and wildlife management, shall:

In those cases when the Fish and Wildlife Service is aware of the grizzly-human conflict situation first, initiate the coordination process by notifying the Departments and the Federal land management agency and participate in the determination of grizzly bear nuisance status, and shall provide necessary expertise required for the control of nuisance grizzly bears.

D. The Departments as the agencies responsible for the management of the States' wildlife resources, shall:

In those cases when the Departments are aware of the grizzly-human conflict situation first, initiate the coordination process by notifying the appropriate Federal land management agency and the Fish and Wildlife Service and otherwise participate in the determination of grizzly bear nuisance status and shall contribute necessary expertise, operational services or other acceptable methods for the control of nuisance grizzly bears.

E. The Park Service, as the agency responsible for the management and administration of all resources in the National Parks shall:

Govern the taking of grizzly bears in National Parks. Park Service Personnel shall be invited to participate in the determination of grizzly bear nuisance status and to participate in the relocation of those bears judged to be potentially suitable for relocation into National Parks.

F. It is Mutually Agreed and Understood By and Among the Said Parties that:

1. All IGBC agencies will exchange phone contact lists of designated representatives assigned to implement these provisions and to decide on nuisance bear status.

2. All IGBC agencies will make an effort to have permittees notify the land management agency of all grizzly bear associated problems and to notify the respective State wildlife agencies when property damage occurs.

3. Relocations of bears between grizzly bear ecosystems will be done in accordance with State and Federal laws, regulations, and policy.

4. Amendments to this Plan may be made at any time with written concurrence of the IGBC and appropriate consultation.

5. Each IGBC agency and the Bureau of Indian Affairs (BIA) (Tribes) will coordinate its respective grizzly bear control procedures in full accordance with this Plan.

6. This plan will become effective on the publication of the final notice in the Federal Register on the Interagency Grizzly Bear Guidelines. This Plan shall automatically be

renewed annually and remain in force until revoked or amended.

7. Any IGBC agency may terminate participation in this Plan upon 120 days written notice to each of the other agencies.

8. The attached Plan provides operational guidelines for determining grizzly bear nuisance status and for controlling nuisance grizzly bears in the conterminous United States. Handling and control of nuisance grizzly bears will be governed by the grizzly bear special rule (50 CFR 17.40) and per discussions and/or resulting agreements between IGBC member agencies and APHIS (Animal and Plant Health Inspection Service) animal damage control.

9. The "Guidelines and a "Plan" have been submitted to the Fish and Wildlife Service as a formal aggregate consultation since the projects, activities, and programs are logically grouped, their effects should be similar and such an aggregate consultation should greatly economize consultation activities related to and required for grizzly management.

The purpose of this document is to:

1. Document management direction agreed upon by participating agencies with respect to determination of grizzly bear nuisance status, and the capture, translocation, release and/or disposal of nuisance grizzly bears.

2. Guide managers in making rapid, effective, and responsible decisions and initiating action regarding grizzly bear control actions.

II. Guidelines for Determining Grizzly Bear Nuisance Status

These guidelines apply to the Management Situation Areas defined in *Interagency Grizzly Bear Guidelines* (IGBC 1986). In Management Situations Areas 1 and 2, grizzlies must be determined to be a nuisance by specific criteria before they can be controlled. In Situation Areas 3 and 5, any grizzly involved in a grizzly-human conflict situation is considered a nuisance and will be controlled. Control must be compatible with Grizzly Bear Recovery Plan objectives for limiting man-caused grizzly mortality and with Federal and State laws and regulations.

A grizzly bear may be determined to be a nuisance if any or all of the following conditions apply:

Condition A. The bear causes significant depredation to lawfully present livestock or uses unnatural food materials (human and livestock foods, garbage, home gardens, livestock carrion, and game meat in possession of man) which have been reasonably secured from the bear resulting in conditioning of the bear or significant loss of property.

Condition B. The bear has displayed aggressive (not defensive) behavior toward humans which constitutes a demonstrable immediate or potential threat to human safety and/or a

minor human injury resulted from a human/bear encounter.

Condition C. The bear has had an encounter with people resulting in a substantial, human injury or loss of human life.

The following are considerations in determining grizzly nuisance status under Condition A:

Unnatural foods were reasonably secure from grizzlies. Reasonably secure means all steps were taken to comply with guideline objectives (a) Maintain and Improve Habitat and (b) Minimize Grizzly-Human Conflict Potential. The following are examples of reasonably secure conditions:

(1) sight and/or smell of edibles and/or garbage was not dominant (i.e., food was canned or in other sealed containers) and edibles and/or garbage was made unavailable (hung out of reach or secured in a solid-sided-bear-proof structure). Livestock use did not occur in habitat components critically important to grizzlies in time or space;

(2) livestock and wildlife carcasses were removed destroyed or treated so that the material would not reasonably be expected to attract grizzlies.

(3) game meat was stored at least 100 yards from any sleeping area;

(4) no baits were placed for purposes of sport hunting black bears, nor did any artificial feeding of bears occur.

The following are considerations in determining grizzly nuisance status under Condition B:

The bear has displayed aggression toward man. Sound evidence must be available to establish that the bear acted aggressively without provocation (not defensively), and that such behavior constituted a threat to human safety and/or a minor human injury occurred as a result of a nondefensive grizzly attack.

The following are considerations in determining grizzly nuisance status under Condition C:

An encounter with people which resulted in a serious human injury or loss of human life. A bear that is involved in an accidental encounter with people, defense of young, or in a provoked attack (the bear acted defensively not aggressively) which results in a minor human injury should not be considered a nuisance under this condition.

If information is insufficient to clearly establish the above requisites under Conditions A, B, and C, then the involved bear(s) probably should not be determined a nuisance under that condition. The criteria in Table 1 should be used to guide control actions.

Preventive Action:

Certain specific grizzlies have known behavioral patterns, which, when combined with location, time and other factors, indicate that an incident is highly probable. In such situations, direct preventive action designed to safely remove the bear(s) from the situation (prior to an occurrence which would result in nuisance status and possible loss of the bear(s) to the ecosystem) can be implemented regardless of the Management Situation involved. Human activities must be in compliance with applicable guidelines to minimize potential for grizzly-human conflicts for that Management Situation. Control actions should be designed to capture and remove the specific target bear(s).

In other situations, a bear may move into a visitor use or residential area without causing an incident, but there is indication that due to its persistent use of the area, it may become overly-familiar with humans and may become habituated. The animal may be relocated if a suitable release site (free of circumstances similar to the capture site) is available. This is an action to prevent a possible incident or habituation of the bear. It does not count as an offense when determining the disposition of the bear (using Table 1), should the bear be recaptured in a future control action.

III. Grizzly Bear Control Action

1. If a grizzly bear is not determined to be a nuisance after consideration of criteria in Section II, no control action will be initiated.

2. Capture of nuisance grizzly bears outside National Parks is the primary responsibility of the State Fish and Game Agency in conjunction with the U.S. Fish and Wildlife Service. The National Park Service is responsible for bear capture within National Parks. Data forms for recording information about the captured bear(s) and the control action are provided in the Appendix. Nuisance bear forms should be completed by the onsite official and forwarded to the Grizzly Bear Recovery Coordinator for subsequent distribution.

3. Nuisance grizzlies that are sick or injured beyond a point where natural recovery is likely will be removed from the population. Other nuisance grizzlies will be controlled according to the guidelines in Table 1.

4. After a bear has been captured during a control action, the decision on where to relocate the bear or whether to kill it must be made within 24 hours of its capture. The relocation must be made as expeditiously as possible after the disposition of the bear is determined. Bears will not be held in a snare but will be immobilized, marked, and placed in an appropriate holding facility (can be a culvert trap).

   With due consideration of mortality risk associated with immobilization grizzly bears released should be marked with numbered ear tags, lip tattoo and functioning radio transmitters. Monitoring will be a cooperative effort between State and Federal agencies. On-site release may be accomplished if the bear taken is: (a) determined not to be a

nuisance bear or; (b) on a first offense when the bear cannot be relocated because of terrain, weather, or inaccessibility to a relocation site. Females with cubs, where relocation is identified in the above table, will be released on-site if relocation is not feasible for previously stated reasons or if the cubs cannot also be caught and relocated with the female. An on-site release will not be conducted in developed areas. On-site releases will be accomplished after approval of the land management agency if the release is monitored in such a way to determine its success or failure with respect to bear survival and conflict resolution.

5. If a bear is to be killed, the action will be completed only by authorized State or Federal or Tribal employees. A grizzly bear mortality report form should be completed and the carcass forwarded to the Montana Department of Fish, Wildlife and Parks lab in Bozeman, Montana, for examination and subsequent disposition.

6. The initiating agency may "take back" a relocated bear, according to case-by-case agreements.

7. The State Fish and Game Regional Office will be the principal coordination point for all control actions, unless specified other-wise in the initial discussions on a particular incident.

The public and news media are extremely interested in all operations involving grizzly bears. To insure that they receive the proper information, it is critical that information be shared between all involved agencies in an accurate and timely manner. Planned news releases will be the responsibility of the State Fish and Game agency in close consultation with the administering land management agency (or Tribe) and the Grizzly Bear Recovery Coordinator.

Table 1. Guidelines for Grizzly Bear Control Action (see Footnotes)

TYPE OF GRIZZLY	NO OFFENSE/ OFFENSE	CONDITION A			CONDITION B		CONDITION C
		1st	2nd	3rd	1st	2nd	1st
FEMALES							
Orphaned Cub***	RLS/REL*						
Cub		REL	REL	REM**	REL	REM	REM
Yearling		REL	REL	REM	REL	REM	REM
Subadult		REL	REL	REM	REL	REM	REM
Prime Adult with Young		REL	REL	REM (Adult)	REL	REM (Adult)	REM (Adult)
Old Adult		REL	REM	---	REM	---	REM
Old Adult with Young		REL	REL	REM (Adult)	REL	REM (Adult)	REM (Adult)
MALES							
Orphaned Cub***	RLS/REL*						
Cub		REL	REL	REM	REL	REM	REM
Yearling		REL	REM	---	REM	---	REM
Subadult		REL	REM	---	REM	---	REM
Prime Adult		REL	REM	---	REM	---	REM
Old Adult		REM		---	REM	---	REM

*REL = Relocate **REM = REMOVE FROM POPULATION ***RLS = RELEASE ON SITE
(Nuisance grizzlies that are sick or injured beyond a point where natural recovery is likely will be removed.)

Cub = Young of the Year
Yearling = 12 to 24 months old
Subadult = 24 to 48 months old
Young = Cub, yearling, or subadult accompanying mother.
Old = Indicates advanced age and deteriorated physical state, indicators are tooth wear and physical appearance.

Literature Cited: Interagency Grizzly Bear Committee. 1986. Interagency grizzly bear guidelines. U.S. For. Serv., Washington, D.C. 100pp.

Agency Contacts for Grizzly Bear Conflicts

Representatives of the following agencies must be alerted immediately of any conflict incident.

Grizzly Bear Recovery Coordinator

U.S. Fish and Wildlife Service
510 Desmond Drive SE
Lacey, Washington 98503

U.S. Department of Agriculture
Wildlife Services

Washington Department of Wildlife
600 Capitol Way North
Olympia, Washington 98501-1091

Depending on the location of the nuisance situation, the following information should assist in determining the correct agency representative to notify after the initial calls above have been made.

A. Washington Department of Fish and Wildlife

1. Region 2
   Washington Dept. Fish and Wildlife
   1550 Alder St. NW
   Ephrata, WA 98823-9699

2. Region 3
   Washington Dept. Fish and Wildlife
   1701 S. 24th Ave
   Yakima, WA 98902-5720

3. Region 4
   Washington Dept. Fish and Wildlife
   16018 Mill Creek Blvd
   Mill Creek, WA 98012-1296

2. Wildlife Services

Rocky Mountains	Chehalis
Tonasket	Moses Lake
Sedro-Woolley	Ellensburg

3. U. S. Fish and Wildlife Service

   Endangered Species
   510 Desmond Drive SE
   Lacey, Washington 98503

   Endangered Species
   11103 E. Montgomery Drive
   Spokane, Washington 99206

4. U. S. Forest Service

   a. Mt. Baker-Snoqualmie National Forest
      21905 64th Avenue West
      Mountlake Terrace, Washington 98043

   b. Okanogan National Forest
      Winthrop Work Center
      24 W. Chewuch Road
      Winthrop, Washington 98862

   c. Wenatchee National Forest
      215 Melody Lane
      Wenatchee, Washington 98801

5. National Park Service

   North Cascades National Park
   810 State Route 20
   Sedro Wooley, Washington 98284

6. Bureau of Land Management

   N1103 Faneher Road
   Spokane, Washington 99212

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APPENDIX F: DRAFT MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

DRAFT MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

-- The Wilderness Act of 1964

Project Title: **North Cascades Ecosystem Grizzly Bear Restoration**

MRDG Step 1: Determination

Determine if Administrative Action is Necessary

Description of the Situation

What is the situation that may prompt administrative action?

The grizzly bear (*Ursus arctos horribilis*) was listed as threatened under the Endangered Species Act (ESA) on July 28, 1975. Following the listing, the US Fish and Wildlife Service (FWS) initiated a recovery effort directed at establishing viable populations in portions of four states where the grizzly bear was known or believed to exist at the time of listing. The remaining grizzly bears in the western United States are managed within six recovery zones: the Greater Yellowstone Ecosystem (GYE) recovery zone in Wyoming and southwest Montana; the Northern Continental Divide Ecosystem (NCDE) recovery zone in northwest Montana; the Cabinet-Yaak Ecosystem (CYE) recovery zone, which includes extreme northwestern Montana and the northern Idaho panhandle; the Selkirk Ecosystem (SE) recovery zone of northern Idaho and northeastern Washington; the Bitterroot Ecosystem (BE) recovery zone in central Idaho and western Montana; and the North Cascades Ecosystem (NCE) recovery zone of northwestern and north-central Washington (USFWS 1993).

The NCE constitutes a large block of contiguous habitat that spans the international border between the United States and Canada but is isolated from grizzly bear populations in other parts of the two countries. The NCE includes all of the North Cascades National Park Complex (11% of the recovery zone) and large portions of the Mount Baker Snoqualmie and Okanogan-Wenatchee National Forests (which together make up 74% of the recovery zone), as well as protected lands and de facto wilderness in British Columbia, Canada (state lands represent 5% of the recovery zone). Research indicates this wilderness landscape is capable of supporting a self-sustaining grizzly bear population (USFWS 1997); however, there have been confirmed observations of only two individual grizzly bears in the NCE in the past ten years, both of which were in the border region of British Columbia (Interagency Grizzly Bear Committee NCE Subcommittee 2016). Given the low number of grizzly bears, very slow reproductive rate, and other recovery constraints, the grizzly bear in the North Cascades was determined to be warranted for endangered status; however, the up-listing has not yet occurred (USFWS 2011). Although a very small number of grizzly bears still inhabit the ecosystem, the

number of grizzly bears in the NCE does not meet the accepted definition for a population (two adult females with cubs or one adult female tracked through two litters) (USFWS 2000). Grizzly bears thus have been functionally extirpated in the North Cascades Ecosystem.

Because the NCE grizzly bears are at risk of local extinction, action is needed at this time to:

- Avoid the permanent loss of grizzly bears in the NCE.
- Contribute to the restoration of biodiversity of the ecosystem for the benefit and enjoyment of present and future generations.
- Enhance the probability of long-term survival and conservation of grizzly bears within the lower 48 states and thereby contribute to overall grizzly bear recovery.
- Support the removal of the grizzly bear from the federal list of threatened and endangered wildlife species.

To address these needs, the National Park Service (NPS), FWS, Washington Department of Fish and Wildlife (WDFW), and US Forest Service (FS) are proposing to restore grizzly bears to the North Cascades Ecosystem. The *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (plan/EIS) evaluates the effects of alternatives for grizzly bear restoration including potential impacts to fish and wildlife, wilderness, recreational use and experience, socioeconomics, public safety, and ethnographic resources. Action alternatives include the capture of 25-200 grizzly bears in other ecosystems and the use of helicopters to transport and release these grizzly bears into the North Cascades over several years. Potential release sites are within the Glacier Peak, Pasayten, and Stephen Mather Wildernesses.

As action is proposed within wilderness, this minimum requirement decision guide assesses whether or not action is needed within the Glacier Peak, Pasayten, and Stephen Mather Wildernesses and if so, determines the minimum tool for doing so.

References:

Interagency Grizzly Bear Committee NCE Subcommittee. 2016. In-person communications and e-mail correspondence between members of the Interagency Grizzly Bear Committee (IGBC) NCE Subcommittee Technical Team and Mike Mayer and Jason Medema, Louis Berger, January – July 2016.

US Fish and Wildlife Service. 1993. Grizzly Bear Recovery Plan. Missoula, MT. 181 pg. September 10, 1993.

US Fish and Wildlife Service. 1997. Grizzly Bear Recovery Plan Supplement: North Cascades Ecosystem Recovery Plan Chapter. June 23, 1997.

US Fish and Wildlife Service. 2000. Grizzly bear recovery in the Bitterroot Ecosystem. Final Environmental Impact Statement. U.S. Fish and Wildlife Service, Missoula, MT. 766pp.

US Fish and Wildlife Service. 2011. Grizzly Bear (*Ursus arctos horribilis*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Missoula, MT.

Options Outside of Wilderness

Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES	**STOP – DO NOT TAKE ACTION IN WILDERNESS**
☒ NO	**EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**

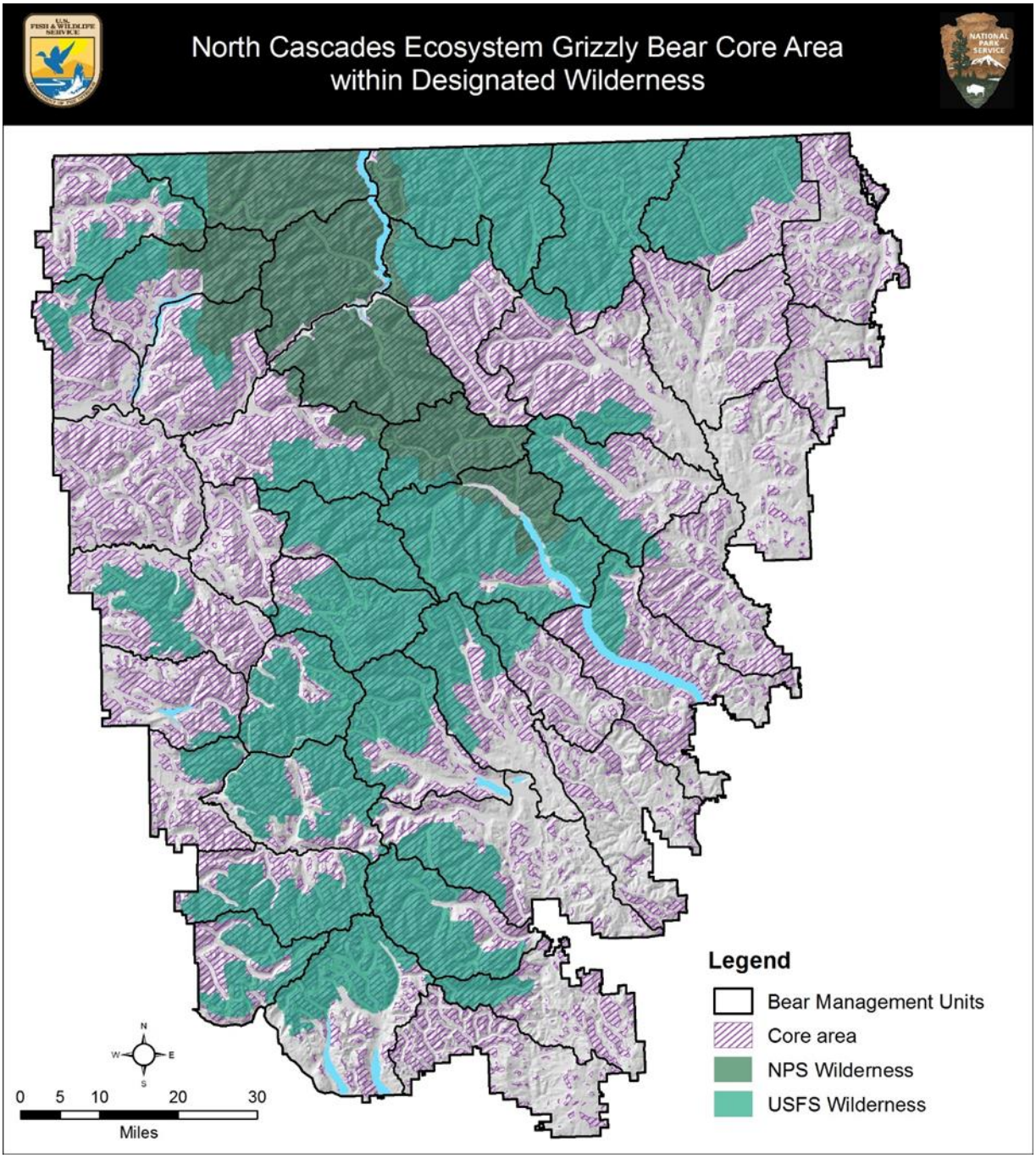
Explain: Ideally, grizzly bears would become naturally restored within the NCE (43% of which is wilderness) without human intervention. In fact for years, land management agencies and other regulatory agencies (i.e. FWS and WDFW) have worked to facilitate the natural recovery of grizzly bears within the NCE by means of habitat protection, sanitation and education, but the native population has instead declined to the extent that the grizzly bear is now functionally extirpated from the ecosystem. It is now clear that translocation (i.e. capturing live grizzly bears elsewhere and releasing them into the NCE) is necessary to restore grizzly bears to the NCE, and in order to maximize the probability of a successful restoration (i.e. grizzly bears establish home ranges and reproduce to establish a local population), these translocations will need to occur at carefully identified release sites that maximize a grizzly bear's chance of survival and future reproduction. Release sites therefore need to include good grizzly bear habitat (as well as connectivity to other habitat) and need to be located in areas close to other grizzly bears (as transplantations take place) in order to facilitate interaction and ultimately breeding. Specifically, locations of release sites need to:

- Be within an area that consists of highly suitable seasonal habitat (Specifically, berry-producing plants that are known grizzly bear foods are present in the area.);
- Be at an adequate distance from high visitor use, non-motorized areas, such that low human-use areas are targeted;
- Be within Bear Management Units (BMUs) with a high amount (>70%) of core area (defined as area more than 500m from roads, motorized trails, or high use hiking trails) (these areas at least need to be prioritized); and
- Include a suitable vehicle-accessible site (with little public use) as a staging area, or a suitable helicopter landing site if no road access exists.

Most release sites that meet these criteria in the NCE are located within designated wilderness. For example, the North Cascades Grizzly Bear Recovery Zone is divided into 42 Grizzly Bear Management Units (BMUs), only 15 of which have a high amount (>70%) of core area, and of those 15, 14 are primarily within wilderness (see Map 1 below). While there are potential suitable release sites for grizzly bears outside of wilderness areas, they are few and far between, and not numerous enough to sustain 25 translocated grizzly bears, much less 200, that are considered within the alternatives of the *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (plan/EIS). Furthermore, once the first few bears are established, additional releases would need to be made in proximity to those established bears – whether they become established in non-wilderness or wilderness areas – in order to maximize the likelihood of a successful establishment. If a grizzly bear establishes a home range within wilderness, as it is assumed, some additional releases would likely need to occur within that wilderness.

Regardless of whether or not individual grizzly bears would be released within wilderness directly, it is assumed that grizzly bears would travel to and establish home ranges in at least portions of the Stephen Mather, Glacier Peak, and Pasayten Wildernesses, and if present in any of these wildernesses, monitoring grizzly bears within that wilderness would be necessary to detect grizzly bears in the NCE, estimate the survival rate of released grizzly bears and their offspring, determine the number of reproducing females and the extent and location of their home ranges. This monitoring cannot occur outside wilderness if grizzly bears are located within designated wilderness.

Map 1: North Cascades Ecosystem Grizzly Bear Core Area within Designated Wilderness



Criteria for Determining Necessity
Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

☐ YES ☒ NO

Explain: The Glacier Peak Wilderness was designated in 1964 as one of the 54 original wilderness areas within the United States. This wilderness area was expanded in 1968, under the same legislation that created North Cascades National Park, and further expanded by the Washington State Wilderness Act of 1984. The Pasayten Wilderness was created in 1968, as part of the same legislation that expanded the Glacier Peak Wilderness and established North Cascades National Park and was later expanded as part of the 1984 Washington State Wilderness Act. The Stephen Mather Wilderness was designated by the Washington Parks Wilderness Act of 1988.There are no Special Provisions in any of the legislation creating these wildernesses that would require grizzly bear restoration and monitoring.

B. Requirements of Other Legislation

Is action necessary to meet the requirements of other federal laws? Cite law and section.

☒ YES ☐ NO

Explain:
Sections 2(c)(1) and 7(a)(1) of the Endangered Species Act (ESA) of 1973, as amended, create an affirmative obligation "…that all federal departments and agencies shall seek to conserve endangered and threatened species" of fish, wildlife, and plants. The grizzly bear is listed under ESA as a threatened species, and the NCE has been designated as a grizzly bear recovery zone. Thus, this obligation under ESA to "…utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered and threatened species" applies to the United States Forest Service and National Park Service who manage lands within the NCE.

Sec.3(3) of the Endangered Species Act provides additional clarity to this affirmative obligation by defining "conserve", "conserving", and "conservation" as using "and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary". "Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as *research*, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and *transplantation…*" (emphasis added).

C. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character, including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Other Features of Value?

UNTRAMMELED

☐ YES ☒ NO

Explain: This action is not necessary to preserve the untrammeled (unhindered or unmanipulated) quality of the Glacier Peak, Pasayten, or Stephen Mather Wildernesses.

UNDEVELOPED

☐ YES ☒ NO

Explain: No, the action does not include removal of existing structures or a reduction of developments. Action is not necessary to preserve the undeveloped quality of the wilderness character of the Glacier Peak, Pasayten, or Stephen Mather Wildernesses.

NATURAL

☒ YES ☐ NO

Explain: The grizzly bear, indigenous to the North Cascades Ecosystem and the wildernesses within it, has been functionally extirpated from the NCE and is currently a federally- and state-listed threatened species. This extirpation not only threatens the overall strength and resiliency of the species, but it has also had a negative impact on the NCE and the natural quality of the wilderness character of the Glacier Peak, Pasayten, and Stephen Mather Wildernesses in that effects from modern civilization, namely the removal of a macro-carnivore, remain so long as this species is functionally extirpated from the ecosystem. Restoration of this species would therefore restore a significant aspect of the natural processes of ecological systems within the Glacier Peak, Pasayten, and Stephen Mather Wildernesses to a state in which they are substantially free from the effects of modern civilization. This restoration is therefore necessary to administer these wilderness areas as wilderness.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☐ YES ☒ NO

Explain: Restoration of the grizzly bear is not necessary to preserve opportunities for solitude or primitive and unconfined recreation in these Wildernesses.

OTHER FEATURES OF VALUE

☒ YES ☐ NO

Explain: Action is necessary to provide the best chance to restore the ecological and scientific value that the presence of grizzly bears contribute to the wilderness character of the Glacier Peak, Pasayten, and Stephen Mather Wildernesses.

Step 1 Decision
Is administrative action necessary in wilderness?

Decision Criteria

A.	Existing Rights or Special Provisions	☐ YES	☒ NO
B.	Requirements of Other Legislation	☒ YES	☐ NO
C.	Wilderness Character		
	Untrammeled	☐ YES	☒ NO
	Undeveloped	☐ YES	☒ NO
	Natural	☒ YES	☐ NO
	Outstanding Opportunities	☐ YES	☒ NO
	Other Features of Value	☒ YES	☐ NO

Is administrative action necessary in wilderness?

☒ YES	**EXPLAIN AND PROCEED TO STEP 2 OF THE MRDG**
☐ NO	**STOP – DO NOT TAKE ACTION IN WILDERNESS**

Explain: The grizzly bear, indigenous to the NCE and the wildernesses within it, has been functionally extirpated from the NCE and is currently a federally-listed threatened species. This extirpation not only threatens the overall strength and resiliency of the species, but it also has had a negative impact on the NCE and the wilderness within it, including the "natural" and "other features of value" qualities of the wilderness character of the Glacier Peak, Pasayten, and Stephen Mather Wildernesses. Restoration of this species would restore a significant aspect of the biodiversity within these wildernesses to a state in which they are substantially free from the effects of modern civilization (natural quality of wilderness character) and would enhance the ecological and scientific values of these wildernesses, in that this action would restore the entire complement of pre-contact macro-predators to the NCE and these wildernesses. Because the restoration of grizzly bears is necessary to restore this important aspect of the "natural" and "other features of value" qualities of these wilderness areas, actions to restore (including releases and subsequent monitoring) the grizzly bear to the Glacier Peak, Pasayten, and Stephen Mather Wildernesses are necessary to administer these areas as wilderness.

Application of the Wilderness Act (specifically Section 4(b) – requirement to preserve wilderness character through "Natural" and "Other Features of Value" qualities of the Wilderness Act) and Endangered Species Act (Section 7(a)) indicate that action is needed to restore the grizzly bear to the Glacier Peak, Pasayten, and Stephen Mather Wildernesses.

MRDG Step 2

Determine the Minimum Activity

Other Direction

*Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

☒ YES **DESCRIBE OTHER DIRECTION BELOW**

☐ NO **SKIP AHEAD TO TIME CONSTRAINTS BELOW**

Describe Other Direction:

Section 4(b) of the Wilderness Act states that "Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, *conservation*, and historical use" (emphasis added)."

Guidance for the US Forest Service, Department of Agriculture:
The National Interagency Memorandum of Agreement (August, 2000) states the Forest Service's shared mission is to "…enhance conservation of imperiled species while delivering appropriate goods and services provided by the lands and resources."

The Policies and Guidelines for Fish and Wildlife Management in National Forest and Bureau of Land Management Wildernesses (as amended June 2006) discusses Threatened and Endangered Species on page 8. The document states, "Actions necessary to conserve or recover threatened or endangered species, including habitat manipulation and special conservation measures, that involve uses generally prohibited under Section 4(c) of the Wilderness Act, will be considered and may be authorized by the Federal administering agency through application of the MRDG as outlined in Section E., General Policy."

The Association of Fish and Wildlife Agencies (AFWA) is an association representing government agencies responsible for North America's fish and wildlife resources. A policy statement between the AFWA and the Forest Service documents the desire of the agencies to work in cooperation with the States on Fish and Wildlife related issues. The policy statement allows for, "Transplants (removal, reintroduction, or supplemental introduction) of terrestrial wildlife species in wilderness may be permitted if necessary: (a) to perpetuate or recover a threatened or endangered species; (b) to restore the population of an indigenous species; or (c) to manage wildlife populations in accordance with the States' wildlife populations objectives."

The Forest Service Manual expands on the agreement with AFWA. Chapter 2323.32 provides the following policy regarding wildlife management in wilderness areas:

1. "Recognize that States have jurisdiction and responsibilities for the protection and management of wildlife and fish populations in wilderness. Cooperate and work closely with State wildlife and fish authorities in all aspects of wildlife and fish management. Base any Forest Service recommendation to State wildlife and fish agencies on the need for protection

and maintenance of the wilderness resource. Recognize wilderness protection needs and identify any needed requirements in coordination efforts and in cooperative agreements with State agencies.

2. Wildlife and fish management programs shall be consistent with wilderness values."

FSM 2323.33a further provides "[re]introduce wildlife species only if the species was once indigenous to an area and was extirpated by human induced events. Favor federally listed threatened or endangered species in reintroduction efforts. Reintroductions shall be made in a manner compatible with the wilderness environment. Motorized or mechanical transport may be permitted if it is impossible to do the approved reintroduction by nonmotorized methods." The Forest Service Manual 2670.22 also calls for the Forest Service to "maintain viable populations of all native and desired nonnative wildlife, fish and plant species in habitats throughout their geographic range on National Forest System Lands."

Guidance for the National Park Service, Department of Interior:

NPS *Management Policies 2006* direct the NPS to take action to restore native plant and animal populations that "have been extirpated by past human caused actions", whenever all of the following criteria are met:

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

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

The Wilderness Management Plan (1989) for the Stephen Mather Wilderness establishes standards for minimal tool, stating, "Non power tools will be preferred. The Wilderness District Ranger will have final approval for the use of power tools...Any use of power tools will be limited as far as possible to before the 4th of July and after Labor Day. All power tools will use a modified muffler that reduces decibel level...Power tools will be limited to chain saws, brushers, rock drills, chain saw winches, and explosives...Aircraft may only be used if stock use is not permitted on trails, trail conditions prevent stock use, or it is impractical to use stock and there is no other practical way to accomplish the work. Aircraft use will be confined to Monday through Thursday and as much as possible to before the 4th of July and after Memorial Day."

Time Constraints
What, if any, are the time constraints that may affect the action?

It is necessary to release grizzly bears during the months of early summer to early fall while there is an abundance of bear foods available and prior to the winter hibernation period.

Components of the Action
What are the discrete components or phases of the action?

Component 1:	Transportation of personnel from staging area to release site
Component 2:	Transportation of grizzly bear in culvert trap to release site
Component 3:	Release of grizzly bear
Component 4:	Removal of empty culvert trap from release site
Component 5:	Removal of personnel from release site
Component 6:	Transport of personnel to monitor bear reproduction
Component 7:	Transport of personnel to monitor bear biology (diet, etc.)
Component 8:	Transport of personnel to retrieve collar
Component 9:	Transport of mortalities
Component 10:	Condition of site after project

Proceed to the alternatives.

Refer to the **MRDG Instructions** regarding alternatives and the effects to each of the comparison criteria.

Alternative 1:

Maximize Efficiency and Data Collection:

Transplant bears to release sites with staff assistance via helicopter; post-monitoring activities and collar retrieval via foot and aircraft; mortalities retrieved via helicopter

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

In this alternative, all grizzly bears released within the NCE would be transported to identified release sites (using criteria described on page 4) via truck and helicopter (see Map 2 for identified release sites). Individual grizzly bears would be live-trapped in other ecosystems that are ecologically similar to the NCE. The trapped bears would then be anesthetized, measured, marked, and fitted with Global Positioning System (GPS) collars and transported in a culvert trap towed by vehicle to staging areas within the NCE. Staging areas would be located in previously disturbed areas close to the identified release site and large enough for (a) the safe landing of a helicopter, (b) parking for a fuel truck, and (c) any other grizzly bear processing needs (see Map 2 for locations of staging areas). Once at the staging area, personnel would be picked up and transported to the release site via helicopter, requiring one round trip of a helicopter flight and one landing at the release site. The helicopter would then return to the staging area to pick up the culvert trap, with grizzly bear inside, via long line, and would transport the trap and bear back to the release site, leaving the site once the culvert trap was detached by personnel onsite (another round trip helicopter flight). Personnel onsite would then open the trap to release the bear, in such a way as to ensure personnel safety, and would remain onsite at a safe distance to ensure the bear successfully left the trap. Following successful release, the helicopter would (1) return to the release site to pick up the empty culvert trap, via long line, and transport it back to the staging area (another round trip helicopter flight), and would then (2) return to the site to pick up the personnel as well (one last round trip with an aircraft landing). All flights would occur between the staging area and release site.

For the purposes of assessing impacts, helicopters would make up to four round-trips per grizzly bear and would require two landings in wilderness, necessary for the release of each grizzly bear and drop-off and retrieval of staff and the culvert trap. Each release could take up to eight hours over the course of one day; however, helicopter flight time over designated wilderness areas would vary (estimated at 0.15-4.8 hours of flight time over wilderness per release) depending on the location of the release site and corresponding staging area. All operations would be conducted during daylight hours. Under all alternatives, capture and release activities would take place between early summer and early fall, depending on the capture and release site(s) selected and availability of natural bear foods during that particular year. Considering the sensitivity of these release activities, the FS and/or NPS could also implement potential temporary local closures (up to a few days) during releases on a site-specific basis.

Following the initial release of grizzly bears into the NCE, the FS and NPS would conduct annual monitoring activities to assess the success of restoration activities – particularly track reproduction and behavior (such as diet and genetic monitoring) – and adaptively manage for future releases. While much of the monitoring work would occur via satellite (i.e. remotely), this alternative would include two annual flights via fixed wing aircraft to monitor reproduction. These flights would occur in the spring and fall and would target areas with known female grizzly bears to try to visually identify if offspring/cubs are present. Onsite monitoring would also occur periodically via foot to study diet (sample scat or monitor vegetation) and genetics (obtain hair samples) within known home ranges.

Under this alternative, staff would also retrieve lost collars via foot whenever feasible, but may use helicopters to retrieve collars in particularly remote areas that could pose safety hazards to personnel

on the ground. Collars would be attached to all released bears and are designed to fall off after four years of use.

Should mortalities occur during years of project implementation, reconnaissance would occur via helicopter (one round-trip flight with landing) in order to transport personnel to site, complete an investigation as to the cause of death, retrieve important remains, and fly back. It is possible that a personnel would determine that a more holistic examination is necessary, which would require laboratory examination of potentially the full remains. In these situations, an additional flight could occur for bears that are too heavy to lift within an internal helicopter load.

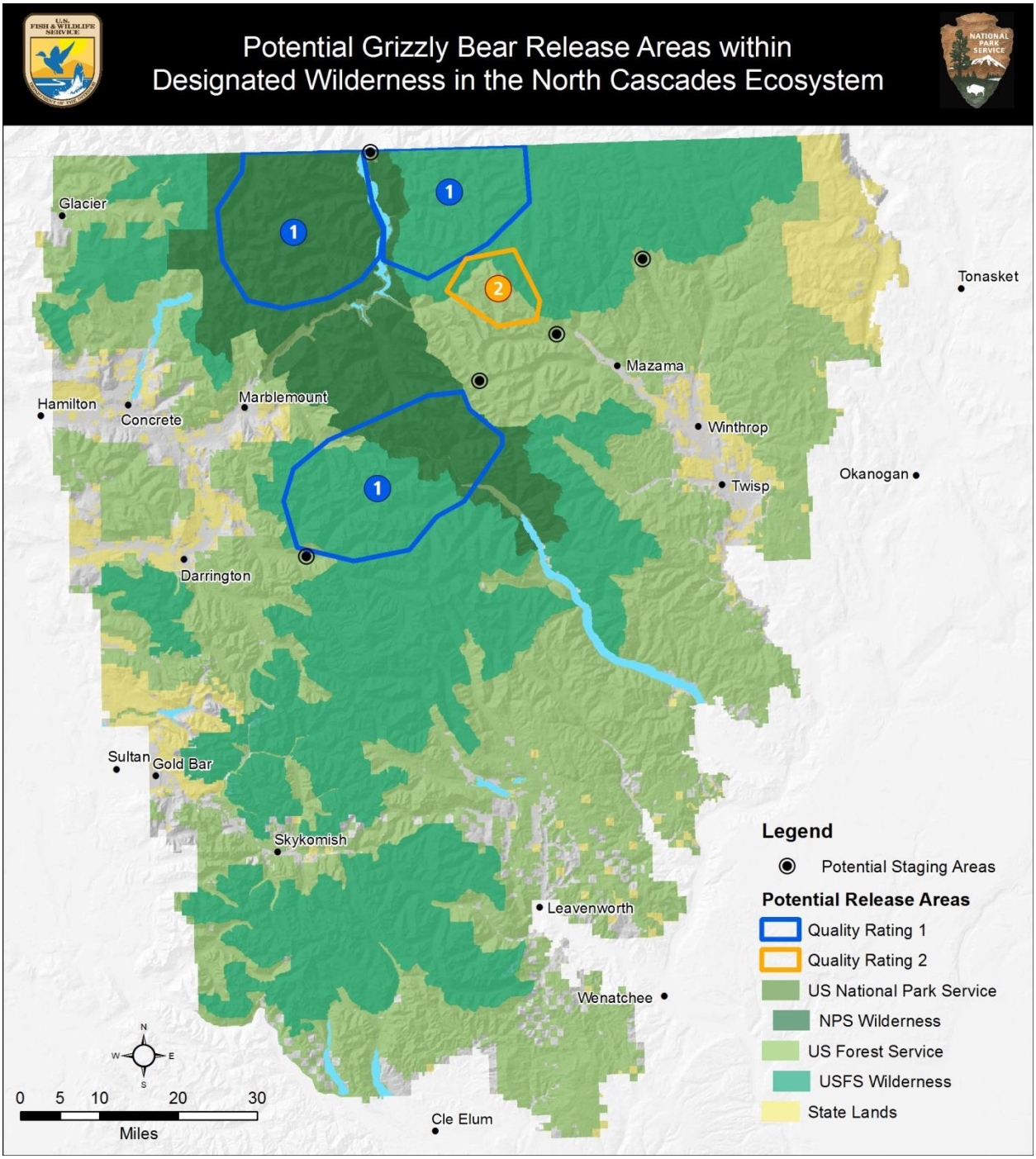
Because of these extensive monitoring procedures, NPS, FWS, FS, and WDFW staff would likely have ample information to adaptively manage grizzly bear restoration and respond to any issues that arise in release efforts in order to ensure the greatest success for restoration. These monitoring procedures would allow staff to estimate survival rate, the number of grizzly bears that establish a home range, and the number of reproducing females in order to determine if the restored grizzly bear population is capable of surviving and reproducing by natural means. They would also be able to detect grizzly bears in the NCE in order to determine grizzly bear density and distribution in the ecosystem, and would furthermore expand scientific understanding regarding grizzly bear habitat use, movement, reproduction and survival.

Component Activities

How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
1	Transportation of personnel from staging area to release site	Personnel transported via helicopter (1 round trip with landing/bear)
2	Transportation of grizzly bear in culvert trap to release site	Bear transported by helicopter (1 sling load/bear).
3	Release of grizzly bear	Release grizzly bear; open culvert trap
4	Removal of empty culvert trap from release site	Trap transported by helicopter (1 sling load/bear)
5	Removal of personnel from release site	Personnel transported via helicopter (1 round trip with landing/bear)
6	Transport of personnel to monitor bear reproduction	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)
7	Transport of personnel to monitor bear biology (diet, etc.)	Reconnaissance and surveys via foot (regardless of number of bears released)
8	Transport of personnel to retrieve collar	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)
9	Transport of mortalities	Personnel transported via helicopter (1 round trip and one landing per mortality)
10	Condition of site after project	Ample information to ensure all objectives are met

Map 2: Potential Grizzly Bear Release Areas within Designated Wilderness in the North Cascades Ecosystem



Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☐	☒
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☐	☒	☐
4	Trap transported by helicopter (1 sling load/bear)	☐	☐	☒
5	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☐	☒
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☐	☒
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☐	☒
8	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)	☐	☐	☒
9	Personnel transported via helicopter (1 round trip and one landing per mortality)	☐	☐	☒
10	Ample information to ensure all objectives are met	☐	☐	☒
Total Number of Effects		0	1	NE
Untrammeled Total Rating		**-1**		

Explain: By reintroducing the grizzly bear to the NCE, the NPS would be actively managing the wilderness through which and in which these animals are expected to travel and establish home ranges. This activity negatively impacts the untrammeled quality of wilderness character in the Glacier Peak, Pasayten, and Stephen Mather Wildernesses.

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☒	☐
2	Bear transported by helicopter (1 sling load/bear).	☐	☒	☐

3	Release grizzly bear; open culvert trap	☐	☐	☒
4	Trap transported by helicopter (1 sling load/bear)	☐	☒	☐
5	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☒	☐
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☒	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☐	☒
8	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)	☐	☒	☐
9	Personnel transported via helicopter (1 round trip and one landing per mortality)	☐	☒	☐
10	Ample information to ensure all objectives are met	☐	☐	☒
Total Number of Effects		0	7	NE
Undeveloped Total Rating		**-7**		

Explain: All impacts listed to the undeveloped quality of wilderness character are from the use of aircraft for transportation. The use of helicopters, aircraft landings, and fixed wing flights are all considered development within wilderness. Helicopter transport (4 flights per released bear (100-800 round trip flights); plus the likely few needed to retrieve collars and mortalities), helicopter landings (2 landings per released bear (50-400 total); plus the likely few needed to retrieve collars), and fixed wing flights (two flights would occur per year that collars are operable; flights would occur where bears are present) would all have short-term negative impacts on the undeveloped quality of wilderness character within each wilderness. Not all actions would occur within every wilderness as actions are related to individual bears; rather impacts would occur respective to where individual bears are released and home ranges are established.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☐	☒
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☒	☐	☐
4	Trap transported by helicopter (1 sling load/bear)	☐	☐	☒
5	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☐	☒
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☐	☒
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☐	☒

8	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)	☐	☐	☒
9	Personnel transported via helicopter (1 round trip and one landing per mortality)	☐	☒	☐
10	Ample information to ensure all objectives are met	☒	☐	☐
Total Number of Effects		2	1	NE
Natural Total Rating		**1**		

Explain: In ensuring successful restoration of a functionally extirpated, federally-listed threatened species through transplants, monitoring, and adaptive management, this action would have a moderate, long-term, beneficial impact on the naturalness of the Glacier Peak, Pasayten, and Stephen Mather Wildernesses because it would improve the processes and biodiversity of these wilderness ecosystems by completing the native predator guild within these wildernesses, which would have positive cascading effects on other species present. These activities would result in the restoration of a federally threatened species and thus the natural quality of wilderness character within each of these wilderness areas. Some negative impacts would occur to the natural quality of wilderness character through the removal of individual mortalities as these grizzly bears may no longer be available as a food source for scavengers nor left to naturally decay.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☒	☐
2	Bear transported by helicopter (1 sling load/bear).	☐	☒	☐
3	Release grizzly bear; open culvert trap	☒	☒	☐
4	Trap transported by helicopter (1 sling load/bear)	☐	☒	☐
5	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☒	☐
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☒	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☒	☐
8	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)	☐	☒	☐
9	Personnel transported via helicopter (1 round trip and one landing per mortality)	☐	☒	☐
10	Ample information to ensure all objectives are met	☒	☐	☐
Total Number of Effects		2	9	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**-7**		

Explain: Actual release activities have the potential to impact summer visitors to the wilderness areas as sounds from transportation to release sites and actions associated with releases will likely occur within wilderness which would temporarily degrade the opportunities for solitude in the Glacier Peak, Pasayten, and Stephen Mather Wildernesses (components #1,2,4,5,8,9). Temporary closures may also occur during releases which could briefly limit access to specific locations within wilderness (component #3). Similarly, seeing personnel in the wilderness and seeing/hearing fixed-wing aircraft associated monitoring would have a short-term negative impact on visitors' opportunities for solitude in the wilderness (components #6 and 7).

At the same time, knowing grizzly bears have been restored to the wilderness, having the slim, though real, chance to see a grizzly bear in the wild and in its native habitat (both component #3), and having enhanced opportunities to learn about grizzly bear restoration (component #10) would have a long-term beneficial impact on opportunities for primitive and unconfined recreation for both visitors to the wilderness and non-visitors alike.

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☐	☒
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☒	☐	☐
4	Trap transported by helicopter (1 sling load/bear)	☐	☐	☒
5	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☐	☒
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☒	☐	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☒	☐	☐
8	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)	☐	☐	☒
9	Personnel transported via helicopter (1 round trip and one landing per mortality)	☒	☐	☐
10	Ample information to ensure all objectives are met	☒	☐	☐
Total Number of Effects		5	0	NE
Other Features of Value Total Rating		**5**		

Explain: The monitoring activities that would accompany grizzly bear restoration (monitoring reproduction and behavior; studying mortalities; adaptively managing restoration efforts to ensure successful restoration) would inform future restoration efforts of a native species – a long-term benefit to scientific understanding of these processes. This information could also be used to enhance education and outreach in and around both wildernesses, a beneficial impact.

Traditional Skills
What is the effect of each component activity on traditional skills?

TRADITIONAL SKILLS

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☒	☐
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☐	☐	☒
4	Trap transported by helicopter (1 sling load/bear)	☐	☐	☒
5	Personnel transported via helicopter (1 round trip with landing/bear)	☐	☒	☐
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☒	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☒	☐	☐
8	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)	☒	☒	☐
9	Personnel transported via helicopter (1 round trip and one landing per mortality)	☐	☒	☐
10	Ample information to ensure all objectives are met	☐	☐	☒
Total Number of Effects		2	5	NE
Traditional Skills Total Rating		**-3**		

Explain: Use of a helicopter to transport staff reduces opportunities to maintain proficiency in the use of non-mechanical travel methods; whereas staff hiking in to sites maintains this proficiency.

Economics
What is the estimated cost of each component activity?

COST

Component Activity for this Alternative		Estimated Cost
1	Personnel transported via helicopter (1 round trip with landing/bear)	$9,600/bear
2	Bear transported by helicopter (1 sling load/bear).	
3	Release grizzly bear; open culvert trap	

4	Trap transported by helicopter (1 sling load/bear)	
5	Personnel transported via helicopter (1 round trip with landing/bear)	
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	$1,600 / bear
7	Reconnaissance and surveys via foot (regardless of number of bears released)	
8	Personnel transported via foot as feasible; helicopter when necessary to access site (potentially 1 round trip with landing/collar)	$4,800 / bear
9	Personnel transported via helicopter (1 round trip and one landing per mortality)	
10	Ample information to ensure all objectives are met	NA
Total Estimated Cost		**$16,000 / bear**

Explain: Initial releases would need to be completed using a large helicopter (i.e. at least a Huges 500 or Jetranger B3 type) due to the weight of the culvert plus a 200-400 lb grizzly bear. The hourly cost of a helicopter averages $1,200. If a helicopter is needed for 8 hours (even if flight time is less than that), each release would cost approximately $9,600, not including staff time. Planning team members estimate that fixed wing flight costs amount to approximately 16 hours of flight time/year, for a total of $8,000. Assuming five bears are released each year, this would cost approximately $1,600 per bear. It was also assumed that a helicopter would need to be procured for two hours for each additional flight such as collar retrieval (per bear) and mortality reconnaissance (per bear), totaling $4,800 per bear. Personnel costs are not factored into this table.

Safety of Visitors & Workers

What is the risk of this alternative to the safety of visitors and workers? What mitigation measures will be taken?

RISK ASSESSMENT	Probability of Accident				
Severity of Accident	Frequent	Likely	Common	Unlikely	Rare
Catastrophic: Death or permanent disability	1 ☐	1 ☐	2 ☐	2 ☐	3 ☒
Critical: Permanent partial disability or temporary total disability	1 ☐	2 ☐	2 ☐	3 ☐	4 ☒
Marginal: Compensable injury or illness, treatment, lost work	2 ☐	3 ☐	3 ☐	4 ☒	4 ☐
Negligible: Superficial injury or illness, first aid only, no lost work	3 ☐	4 ☐	4 ☐	4 ☒	4 ☐
Risk Assessment	**Moderate**				

Risk Assessment Code

1 = Extremely High Risk	2 = High Risk	3 = Moderate Risk	4 = Low Risk

Explain: Use of a helicopter is the most hazardous component of this project. Accidents are rare but can be catastrophic when they occur. This hazard would be mitigated through the use of a standard Project Aviation Safety Plan that would include use of qualified and agency approved helicopter, flight, and ground crews, etc.

Summary Ratings for Alternative 1

Wilderness Character	
Untrammeled	-1
Undeveloped	-7
Natural	1
Solitude or Primitive & Unconfined Recreation	-7
Other Features of Value	5
Wilderness Character Summary Rating	**-9**

Traditional Skills	
Traditional Skills	-3

Economics	
Cost	**$16,000 / bear**

Safety	
Risk Assessment	Moderate Risk

Alternative 2:

Adaptively Manage Releases and Ensure Proper Data Collection:
Transplant bears to release sites with minimal staff assistance via truck or helicopter; post-monitoring activities via foot and aircraft; collar retrieval primarily via foot; mortalities retrieved via helicopter only following on-site reconnaissance

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

In this alternative, grizzly bears released within the NCE would be transported to identified release sites either via truck or a combination of truck and helicopter. Like alternative 1, individual grizzly bears would be live-trapped in other ecosystems that are ecologically similar to the NCE. The trapped bears would then be anesthetized, measured, marked, and fitted with Global Positioning System (GPS) collars and transported in a culvert trap towed by vehicle to either a release site that is accessible via road (very few of these locations exist) or a staging area within the NCE.

For release sites that are accessible via road (again, very few of these locations exist), no prohibited uses would occur within designated wilderness. However, for release sites that are not accessible via road (most of the likely suitable release locations), releases would occur via helicopter from established staging areas that meet the criteria outlined in alternative 1. Initially, releases would occur similar to those in alternative 1 – with four flights and two landings per release to allow personnel onsite to facilitate the release. However, should initial releases go smoothly and without incident, transport of personnel could diminish over time so that eventually staff may not be required onsite for releases so long as a remote release system can be developed and used effectively. Without staff onsite, this alternative would require a helicopter to transport the culvert trap, with bear inside, from the staging area to the release site via long line, release the culvert trap at the release site, and remotely open the culvert trap. Personnel would then need to hike to the site (as close to the timed release as possible) to enable the helicopter to return and pick up the culvert trap (while a helicopter can remotely release a load, personnel are needed onsite to attach a load) for removal at a later date.

For the purposes of assessing impacts, helicopters would initially make up to four round-trips per grizzly bear and would require two landings in wilderness. Over time, this would reduce to two round-trips per grizzly bear and no landings. Each initial release could take up to eight hours over the course of one day but may eventually entail helicopter flights over the course of two days. While helicopter flight time over designated wilderness areas would initially be up to 4.8 hours per release, it would eventually diminish to an estimated 0.75-2.4 hours of flight time per release depending on the location of the release site and corresponding staging area. Like alternative 1, capture and release activities would take place between early summer and early fall and all operations would be conducted during daylight hours. Considering the sensitivity of these release activities, the FS and/or NPS could also implement potential temporary local closures (up to a few days) during releases on a site-specific basis. These closures are more likely to occur in areas where releases occur along a road as these locations would likely be associated with higher visitor use as they are in existing visitor use corridors.

Following the initial release of grizzly bears into the NCE, annual monitoring activities would be conducted to assess the success of restoration activities similar to those outlined in alternative 1. While much of the monitoring work would occur via satellite (i.e. remotely), this alternative would also include two annual flights via fixed wing aircraft operating at least 500 ft Above Ground Level (AGL) to monitor reproduction. These flights would occur in the spring and fall and would target areas with known female grizzly bears to try to visually identify if offspring are present. Onsite monitoring would also occur periodically via foot to study diet (sample scat or monitor vegetation) and genetics (obtain hair samples) within known home ranges.

Under this alternative, staff would retrieve lost collars via foot whenever feasible, but could retrieve collars via helicopter when in extremely remote/hazardous areas. Collars would be attached to all released bears and are expected to fall off after four years of use.

Should mortalities occur during years of project implementation, onsite reconnaissance would occur via foot whenever possible. If personnel onsite believe retrieval of the bear could inform understanding of the recovery effort, the bear could be picked up via helicopter long line. This would entail one round trip flight without a landing.

Because of these extensive monitoring procedures, NPS, FWS, FS, and WDFW staff would likely have ample information to adaptively manage grizzly bear restoration and respond to any issues that arise in release efforts in order to ensure successful restoration. These monitoring procedures would allow staff to estimate survival rate, the number of grizzly bears that establish a home range, and the number of reproducing females in order to determine if the restored grizzly bear population is capable of surviving and reproducing by natural means. They would also be able to detect grizzly bears in the NCE in order to determine grizzly bear density and distribution in the ecosystem, and would furthermore expand scientific understanding regarding grizzly bear habitat use, movement, reproduction and survival.

Component Activities

How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
1	Transportation of personnel from staging area to release site	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap
2	Transportation of grizzly bear in culvert trap to release site	Bear transported by helicopter (1 sling load/bear).
3	Release of grizzly bear	Release grizzly bear; open culvert trap
4	Removal of empty culvert trap from release site	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site
5	Removal of personnel from release site	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot
6	Transport of personnel to monitor bear reproduction	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)
7	Transport of personnel to monitor bear biology (diet, etc.)	Reconnaissance and surveys via foot (regardless of number of bears released)
8	Transport of personnel to retrieve collar	Personnel transported via foot; potential flight to retrieve collars in remote locations
9	Transport of mortalities	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)
10	Condition of site after project	Ample information to ensure all objectives are met

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap	☐	☐	☒
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☐	☒	☐
4	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site	☐	☐	☒
5	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot	☐	☐	☒
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☐	☒
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☐	☒
8	Personnel transported via foot; potential flight to retrieve collars in remote locations	☐	☐	☒
9	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)	☐	☐	☒
10	Ample information to ensure all objectives are met	☐	☐	☒
Total Number of Effects		0	1	NE
Untrammeled Total Rating		**-1**		

Explain: By reintroducing the grizzly bear to the NCE, the NPS would be actively managing the wilderness through which and in which these animals are expected to travel and establish home ranges. This activity negatively impacts the untrammeled quality of wilderness character in the Glacier Peak, Pasayten, and Stephen Mather Wildernesses.

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap	☐	☒	☐
2	Bear transported by helicopter (1 sling load/bear).	☐	☒	☐

3	Release grizzly bear; open culvert trap (culvert left in wilderness while personnel hike to site)	☐	☒	☐
4	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site	☐	☒	☐
5	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot	☐	☒	☐
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☒	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☐	☒
8	Personnel transported via foot; potential flight to retrieve collars in remote locations	☐	☒	☐
9	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)	☐	☒	☐
10	Ample information to ensure all objectives are met	☐	☐	☒
Total Number of Effects		0	8	NE
Undeveloped Total Rating		**-8**		

Explain: The use of helicopters, aircraft landings, and fixed wing flights are all considered development within wilderness. Although similar types of impacts would occur as in alternative 1 (helicopter flights, aircraft landings, and fixed wing flights), the number and duration of impacts would be less as 1) some bears may be released via road in non-wilderness, requiring no prohibited uses within wilderness, 2) personnel would eventually not be transported to and from releases in wilderness, cutting in half the number of flights and flight hours and eliminating aircraft landings associated with releases and retrieval of mortalities, and 3) collars would mostly be retrieved via foot with potentially one flight to retrieve those in more inaccessible locations. All this said, the culvert would likely remain within wilderness for a short period of time as staff hike to the site which would adversely impact the undeveloped quality of wilderness character, even if only temporarily (few days). As with alternative 1, not all actions would occur within every wilderness as actions are related to individual bears. Impacts instead would occur respective to where individual bears are released and home ranges are established.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap	☐	☐	☒
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☒	☐	☐
4	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site	☐	☐	☒
5	Personnel initially transported via helicopter (1 round trip	☐	☐	☒

	with landing/bear); eventually transported via foot			
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☐	☒
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☐	☒
8	Personnel transported via foot; potential flight to retrieve collars in remote locations	☐	☐	☒
9	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)	☐	☒	☐
10	Ample information to ensure all objectives are met	☒	☐	☐
Total Number of Effects		2	1	NE
Natural Total Rating		**1**		

Explain: In ensuring successful restoration of a functionally extirpated, federally-listed threatened species through transplants, monitoring, and adaptive management, this action would have a moderate, long-term, beneficial impact on the naturalness of the Glacier Peak, Pasayten, and Stephen Mather Wildernesses because it would improve the processes and biodiversity of these wilderness ecosystems by completing the native predator guild within these wildernesses, which would have positive cascading effects on other species present. These activities would result in the restoration of a federally threatened species and thus the natural quality of wilderness character within each of these wilderness areas.

Some negative impacts would occur to the natural quality of wilderness character through the removal of individual mortalities as these grizzly bears would no longer be available as a food source for scavengers nor left to naturally decay.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap	☐	☒	☐
2	Bear transported by helicopter (1 sling load/bear).	☐	☒	☐
3	Release grizzly bear; open culvert trap	☒	☒	☐
4	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site	☐	☒	☐
5	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot	☐	☒	☐
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☒	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☐	☒	☐
8	Personnel transported via foot; potential flight to retrieve	☐	☒	☐

	collars in remote locations			
9	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)	☐	☒	☐
10	Ample information to ensure all objectives are met	☒	☐	☐
Total Number of Effects		2	9	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**-7**		

Explain: Actual release activities have the potential to impact summer visitors to the wilderness areas as sounds from transportation to release sites and actions associated with releases will likely occur within wilderness which would temporarily degrade the opportunities for solitude in the Glacier Peak, Pasayten, and Stephen Mather Wildernesses. Because fewer flights/flight hours are anticipated under this alternative, it is assumed these impacts to solitude would be slightly less than those under alternative 1 (components #1,2,4,5,8,9). Temporary closures may also occur during releases (a few days at most), particularly if releases occur on or near roads which could briefly limit access to specific locations within wilderness (related to component #3). Similarly, seeing personnel in the wilderness and seeing/hearing fixed-wing aircraft associated monitoring (components #6 and 7) would have a short-term negative impact on visitors' opportunities for solitude in the wilderness.

At the same time, knowing grizzly bears have been restored to the wilderness, having the slim, though real, chance to see a grizzly bear in the wild and in its native habitat, and having enhanced opportunities to learn about grizzly bear restoration would have a long-term beneficial impact on opportunities for primitive and unconfined recreation for both visitors to the wilderness and non-visitors alike (components #3 and 10).

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap	☐	☐	☒
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☒	☐	☐
4	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site	☐	☐	☒
5	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot	☐	☐	☒
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☒	☐	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☒	☐	☐
8	Personnel transported via foot; potential flight to retrieve collars in remote locations	☐	☐	☒
9	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)	☒	☐	☐

10	Ample information to ensure all objectives are met	☒	☐	☐
Total Number of Effects		5	0	NE
Other Features of Value Total Rating		**5**		

Explain: The monitoring activities that would accompany grizzly bear restoration (monitoring reproduction and behavior; studying mortalities; adaptively managing restoration efforts to ensure successful restoration) would inform future restoration efforts of native species – a long-term benefit to scientific understanding of these processes. This information could also be used to enhance education in and around both wildernesses, a beneficial impact.

Traditional Skills

What is the effect of each component activity on traditional skills?

TRADITIONAL SKILLS

Component Activity for this Alternative		Positive	Negative	No Effect
1	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap	☒	☒	☐
2	Bear transported by helicopter (1 sling load/bear).	☐	☐	☒
3	Release grizzly bear; open culvert trap	☐	☐	☒
4	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site	☐	☐	☒
5	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot	☒	☒	☐
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	☐	☒	☐
7	Reconnaissance and surveys via foot (regardless of number of bears released)	☒	☐	☐
8	Personnel transported via foot; potential flight to retrieve collars in remote locations	☒	☐	☐
9	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)	☒	☐	☐
10	Ample information to ensure all objectives are met	☐	☐	☒
Total Number of Effects		5	3	NE
Traditional Skills Total Rating		**2**		

Explain: Use of a helicopter to transport staff reduces opportunities to maintain proficiency in the use of non-mechanical travel methods; having staff hike in to sites maintains this proficiency.

Economics
What is the estimated cost of each component activity?

COST

	Component Activity for this Alternative	Estimated Cost
1	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot to assist with removal of culvert trap	~$6,750/bear (average)
2	Bear transported by helicopter (1 sling load/bear).	
3	Release grizzly bear; open culvert trap	
4	Trap transported by helicopter (1 sling load/bear); likely delayed to wait for personnel to hike to site	
5	Personnel initially transported via helicopter (1 round trip with landing/bear); eventually transported via foot	
6	Fixed wing aircraft (2 times/year for duration collars are operable; regardless of number of bears released)	$1,600 / bear
7	Reconnaissance and surveys via foot (regardless of number of bears released)	
8	Personnel transported via foot; potential flight to retrieve collars in remote locations	$2,400 / bear (average)
9	Personnel hike to/from site; grizzly bear transported via helicopter (1 roundtrip with sling load)	
10	Ample information to ensure all objectives are met	NA
Total Estimated Cost		**$10,750 / bear**

Explain: This cost table has been created for the purposes of comparison between alternative 1 and 2 and does not represent actual estimated costs of this alternative given the number of assumptions as outlined below.

This cost table estimates costs once personnel are no longer needed onsite to ensure a successful release occurs and does not factor in the costs for personnel which are not de minimis. (A field technician makes approximately $22.00/hour. With travel costs, a four day backcountry trip costs close to $1,000 for one staff; at least two staff would hike to site). Costs per bear for releases has therefore been averaged over the life of the plan assuming 25-34 bears are released in total and the last 15-20 do not require personnel onsite. For releases that do not require personnel on site, the duration of flight hours is assumed to be half of those with personnel onsite. Again, this average does not include personnel costs. The assumed cost per flight hour remains the same as in alternative 1: $1,200.

Like alternative 1, planning team members estimate that fixed wing flights will amount to approximately 16 hours of flight time/year, for a total of $8,000. Assuming five bears are released each year, this would cost approximately $1,600 per bear.

Similar to alternative 1, it was assumed that a helicopter would need to be procured for two hours for each flight needed to retrieve a collar in a remote location or transport a mortality, but that these flights

would not occur for every bear. Rather, for the sake of estimating costs, it was assumed that 2 collars out of every 5 would drop in a remote location requiring a flight and 3 mortalities out of every 5 would require some retrieval (i.e. this means ½ of the flights estimated in Alternative 1). The costs of these flights for these respective collars and mortalities were then averaged over the assumed 25-34 bears released into wilderness.

Safety of Visitors & Workers

What is the risk of this alternative to the safety of visitors and workers? What mitigation measures will be taken?

RISK ASSESSMENT	Probability of Accident				
Severity of Accident	Frequent	Likely	Common	Unlikely	Rare
Catastrophic: Death or permanent disability	1 ☐	1 ☐	2 ☐	2 ☐	3 ☒
Critical: Permanent partial disability or temporary total disability	1 ☐	2 ☐	2 ☐	3 ☐	4 ☒
Marginal: Compensable injury or illness, treatment, lost work	2 ☐	3 ☐	3 ☐	4 ☒	4 ☐
Negligible: Superficial injury or illness, first aid only, no lost work	3 ☐	4 ☐	4 ☐	4 ☒	4 ☐
Risk Assessment	**Moderate**				

Risk Assessment Code

1 = Extremely High Risk	2 = High Risk	3 = Moderate Risk	4 = Low Risk

Explain: Use of a helicopter is the most hazardous component of this project. Accidents are rare but can be catastrophic when they occur. This hazard would be mitigated through the use of a standard Project Aviation Safety Plan that would include use of qualified and agency approved helicopter, flight, and ground crews, etc.

Summary Ratings for Alternative 2

Wilderness Character	
Untrammeled	-1
Undeveloped	-8
Natural	1
Solitude or Primitive & Unconfined Recreation	-7
Other Features of Value	5
Wilderness Character Summary Rating	**-10**

Traditional Skills	
Traditional Skills	2

Economics	
Cost	**$10,750 / bear**

Safety	
Risk Assessment	Moderate Risk

MRDG Step 2: Alternatives Not Analyzed

Alternatives Not Analyzed
What alternatives were considered but not analyzed? Why were they not analyzed?

Complete All Releases via Road: As discussed in Step 1, grizzly bears need to be released in areas with good grizzly bear habitat (as well as connectivity to other habitat) and in close proximity to other grizzly bears (as transplantations take place) in order to facilitate interaction and ultimately breeding. Specifically, locations of release sites need to be:

- Be within an area that consists of highly suitable seasonal habitat (Specifically, berry-producing plants that are known grizzly bear foods are present in the area.);
- Be at an adequate distance from high visitor use, non-motorized areas, such that low human-use areas are targeted;
- Be within Bear Management Units (BMUs) with a high amount (>70%) of core area (defined as area more than 500m from roads, motorized trails, or high use hiking trails) (these areas at least need to be prioritized); and
- Include a suitable vehicle-accessible site (with little public use) or a suitable helicopter landing site if no road access exists.

Most release sites that meet these criteria in the NCE are located within designated wilderness and are, by nature, far from most roads within the NCE. While there are potential suitable release sites for grizzly bears outside of wilderness areas, they are few and far between, and not numerous enough to sustain the reintroduction of 25-34 grizzly bears, much less 200, that are considered within the alternatives of the *North Cascades Ecosystem Grizzly Bear Restoration Plan / Environmental Impact Statement* (plan/EIS).

Personnel hike to site for releases: Release sites would be chosen for habitat quality, quantity and distribution, as well as remoteness from areas of high human use (security). Most of the sites would likely require two-three (or more) days to hike to, and some/most would be a considerable distance from established trails. This requires cross-country hiking that can significantly increase travel time per mile, depending on terrain and/or vegetation. Bears captured in source areas would be held in culvert traps from time of capture until release. Particularly as these activities will be happening during hot summer months, the amount of time any of the bears spends in a trap must be minimized. Release will need to be in the shortest possible window of time after capture: this would include handling time and hours spent driving from the capture site to the staging site. The process must begin immediately after a bear has been detected in a trap, which is unpredictable. Waiting for crews to hike to a release site could add days to the bear's time in a culvert trap. This would be inhumane and possibly/likely endanger the bear's health; hence this alternative was considered but dismissed from further consideration.

No Personnel Present for Releases: Personnel will be, at least initially, needed to monitor the grizzly bear's exit from the trap and its well-being after its many hours in the culvert trap (in other words, ensure that the grizzly bear was successfully transplanted). While it is planned that the trap will be opened remotely (either from the ground or from the air), the alternative to staff onsite would require the presence of a helicopter hovering overhead, waiting for the bear to depart, which would most likely prolong if not prevent a bear's exit. In addition, remote-area releases via helicopter will be new to most, if not all, personnel involved, and it will be important to learn and develop techniques for how best to complete them to ensure successful translocations in the future. Any malfunctions on the ground will need to be dealt with in short order to ensure the bear's safety and timely exit.

Complete all Reproductive Monitoring via Foot: In order to determine whether or not this proposed restoration is successful, this project must be able to confirm successful reproduction of translocated bears. Grizzly bears are wide-ranging animals who typically avoid human activity when and where possible. They can travel many miles in a day over steep and rugged terrain. While satellite collars provide current location data, the ability of ground crews to locate, keep up with, and observe several (or more) bears with offspring during the spring and fall over potentially vast, off-trail, rugged, heavily-vegetated areas of the ecosystem would be prohibitive. Safety would also be an issue, as crews would be intentionally approaching a potentially reproductive female grizzly bear at close range (given limited visibility across the terrain, particularly in spring when grizzly bears make a lot of use of riparian and avalanche chute habitats) in order to count her cubs. For these reasons, this alternative was considered but dismissed from further analysis.

Complete all Reproductive Monitoring via Stock: In addition to those reasons mentioned above, much of the terrain across the NCE is inaccessible to stock. While bears and other wildlife do use human trails, most of their habitat use can be expected to be in trail-less areas that are not reachable by stock. In addition, while grizzly bear attacks on horses/stock are exceedingly rare, the responses of horses to these animals adds a component of risk. Finding a grizzly bear remaining relatively stationary in an area accessible to horses might be possible some of the time, but this still runs the risk of surprise encounters with the study animal, causing unneeded energetic stress to both the female bear and any offspring, and places the crew and stock in unnecessary danger.

Abandon Collars in Place/Do Not Retrieve: Collars are expected to fall off grizzly bears after four years, at which time they will fall to the ground wherever the bear is located at the time. Given the habitat that bears prefer, this will likely be in a remote area across rugged terrain that may not be accessible to humans via foot. While collars could reasonably be left in place, this alternative was dismissed for two reasons: 1) leaving collars in place would equate to a long term impact to the undeveloped quality of wilderness character whereas retrieval could require, at worst, a short/temporary incursion into wilderness, and 2) satellite collars operate off lithium ion batteries which could leach heavy metals into the soil wherever abandoned.

MRDG Step 2: Alternative Comparison

Alternative 1:	**Maximize Efficiency and Data Collection:** Transplant bears to release sites with staff assistance via helicopter; post- monitoring activities and collar retrieval via foot and aircraft; mortalities retrieved via helicopter
Alternative 2:	**Adaptively Manage Releases and Ensure Proper Data Collection:** Transplant bears to release sites with minimal staff assistance via truck or helicopter; post-monitoring activities via foot and aircraft; collar retrieval primarily via foot; mortalities retrieved via helicopter only following on-site reconnaissance

Wilderness Character	Alternative 1		Alternative 2	
	+	-	+	-
Untrammeled	0	1	0	1
Undeveloped	0	7	0	8
Natural	2	1	2	1
Solitude/Primitive/Unconfined	2	9	2	9
Other Features of Value	5	0	5	0
Total Number of Effects	9	18	9	19
Wilderness Character Rating	-9		-10	
Traditional Skills	Alternative 1		Alternative 2	
	+	-	+	-
Traditional Skills	2	5	5	3
Traditional Skills Rating	**-3**		**2**	
Economics	Alternative 1		Alternative 2	
Cost	$16,000 / bear		$10,750 / bear	
Safety of Visitors & Workers	Alternative 1		Alternative 2	
Risk Assessment	Moderate risk		Moderate risk	

MRDG Step 2: Determination

Refer to the **MRDG Instructions** before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative

☐	Alternative 1:	**Maximize Efficiency and Data Collection:** Transplant bears to release sites with staff assistance via helicopter; post-monitoring activities and collar retrieval via foot and aircraft; mortalities retrieved via helicopter
☒	Alternative 2:	**Adaptively Manage Releases and Ensure Proper Data Collection:** Transplant bears to release sites with minimal staff assistance via truck or helicopter; post-monitoring activities via foot and aircraft; collar retrieval primarily via foot; mortalities retrieved via helicopter only following on-site reconnaissance

Explain Rationale for Selection:

When comparing the alternatives considered above, the planning staff for this project noted that almost all beneficial impacts to wilderness character identified in this MRDG would have at least moderate beneficial impacts on wilderness character that would last in perpetuity; whereas all adverse impacts to wilderness character would be mostly transient and short-term (limited to the number of years of implementation), and in some cases, very unlikely to occur. Therefore, the numerical ratings in the "Alternatives Comparison" table are not sufficient on their own to evaluate and compare these alternatives.

For example, it appears from the numerical rating that Alternative 2 would have more impacts on wilderness character than Alternative 1. However, this is not a fair assessment. The one-point difference between the two alternatives in the scoring under wilderness character is because, all other impacts scored similarly (i.e. presence of impact), Alternative 2 could result in an additional type of impact to the opportunities for solitude quality of wilderness character - from potentially closing an area (for 2-3 days) around the release of a grizzly bear should it occur from a road. If this should occur though, that specific release would not be associated with helicopter flights which impact both the undeveloped and opportunities for solitude qualities of wilderness character. In fact, alternative 2 would result in fewer flights/flight hours and fewer helicopter landings within wilderness as personnel would be asked to hike in more frequently (like in the case of retrieving mortalities), if not, remain off site (like in the case of releases eventually).

Therefore, Alternative 2, is determined to be the minimum tool to implement grizzly bear restoration in the NCE.

Describe Monitoring & Reporting Requirements:

All helicopter and fixed wing flights, flight routes, and flight hours over the wildernesses shall be recorded and shared with the appropriate personnel at North Cascades National Park Service Complex, Mount Baker-Snoqualmie National Forest, and Okanogan-Wenatchee National Forest on an annual basis. These reports should include flight hours and type of aircraft. Wildlife biologists shall also track and report (per wilderness) the number of temporary camera stations installed in the wilderness as a result of monitoring grizzly bears and the duration of operation of each station.

Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

Prohibited Use		Quantity
☐	Mechanical Transport:	
☐	Motorized Equipment:	
☐	Motor Vehicles:	
☐	Motorboats:	
☐	Landing of Aircraft:	
☐	Temporary Roads:	
☐	Structures:	
☐	Installations:	

Approved	Name	Position	
		Forest Supervisor, Okanogan-Wenatchee National Forest	
	Signature		Date

Approved	Name	Position	
		Forest Supervisor, Mount Baker-Snoqualmie National Forest	
	Signature		Date

Approved	Name	Position	
		Superintendent, North Cascades National Park Service Complex	
	Signature		Date

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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