Final Environmental Impact Statement
for the Barred Owl Management Strategy

U.S. Fish and Wildlife Service
June 2024

COVER SHEET

Title of Proposed Action:	Implementation of the Proposed Barred Owl Management Strategy in Washington, Oregon, and California
Subject:	Final Environmental Impact Statement
Lead Agency:	U.S. Fish and Wildlife Service
Cooperating Agencies:	Bureau of Land Management (Oregon), Bureau of Land Management (California), National Park Service, United States Forest Service, Animal and Plant Health Inspection Service - Wildlife Services, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, Oregon Department of Fish and Wildlife, Oregon Department of Forestry, California Department of Fish and Wildlife, California Department of Forestry and Fire Protection.
County/State:	Oregon, Washington, California

Abstract: The U.S. Fish and Wildlife Service has developed a proposed Barred Owl Management Strategy to address the threat of the non-native, invasive barred owl to the native northern and California spotted owls. This action is necessary to support the survival of the threatened northern spotted owl and avoid substantial impacts to the California spotted owl populations from barred owl competition. This Final Environmental Impact Statement was prepared pursuant to the National Environmental Policy Act. This Final Environmental Impact Statement evaluates the impacts of six alternatives, including the preferred alternative and a no action alternative, on the human environment, including spotted owls, barred owls, other wildlife species, recreation and visitor use, wilderness areas, socioeconomics, and climate change.

Estimated Cost of EIS Development: $305,000

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Executive Summary

We, the U.S. Fish and Wildlife Service (Service), have developed a proposed Barred Owl Management Strategy (proposed Strategy) to address the threat of the non-native, invasive barred owl (*Strix varia*) to the native northern and California spotted owls (S*trix occidentalis*). This action is necessary to support the survival of the threatened northern spotted owl (*Strix occidentalis caurina*) and avoid substantial impacts to the California spotted owl (*Strix occidentalis occidentalis*) populations from barred owl competition. This Final Environmental Impact Statement (FEIS) was prepared pursuant to the National Environmental Policy Act and describes and evaluates the impacts of the proposed action and alternatives to the human environment, including spotted owls, barred owls, other wildlife species, recreation and visitor use, wilderness areas, socioeconomics, and climate change, and describes the potential effect of climate change on environmental resources affected by the proposed action and alternatives.

ES 1 Background

Spotted owls are native to western North America. Competition from non-native invasive barred owls has been identified as a primary threat to the northern spotted owl and a significant and increasing threat to the California spotted owl. Additional primary threats include the loss of habitat to timber harvest on non-federal lands and to wildfires on Federal lands. Barred owls, native to eastern North America, began to expand their range around 1900, concurrent with European settlement and facilitated by the subsequent human-caused changes to the Great Plains and northern boreal forest. The slightly larger and more aggressive barred owls quickly displaced spotted owls from their historical territories.

Based on a recent demographic meta-analysis, extirpation of northern spotted owls from major portions of their historical range is likely in the near future without management of barred owls (Franklin et al. 2021, p. 19). In recent years, barred owls have penetrated into the range of the California spotted owl in the Sierra Nevada Mountains, although the barred owl population generally remains low and scattered in most of the California spotted owl range at this time. While barred owls have not substantially impacted California spotted owl populations to date, the establishment of a small, barred owl population in the northern Sierra Nevada, and the history of the invasion and impacts on northern spotted owls following such expansion, indicates that barred owls are a significant threat to the persistence of California spotted owls.

ES 1.1 Purpose and Need for the Proposed Action

The purpose of this action is to reduce barred owl populations to improve the survival and recovery of northern spotted owls and to prevent declines in California spotted owls from barred owl competition. Relative to northern spotted owls, the purpose is to reduce barred owl populations within selected treatment areas in the short term and increase northern spotted owl populations in those treatment areas. Relative to the California spotted owl, the purpose is to limit the invasion of barred owls into the range of the subspecies and provide for a rapid response to remove barred owl populations that may become established.

The need for this action is that barred owls compete with northern and California spotted owls. Competition from barred owls is a primary cause of the rapid and ongoing decline of northern spotted owl populations. Due to the rapidity of the decline, it is critical that we manage barred owl populations to reduce their negative effect before northern spotted owls are extirpated from large portions of their native range. As stated in the recent northern spotted owl demographic meta-analysis: "[N]orthern spotted owl populations potentially face extirpation if the negative effects of barred owls are not ameliorated while maintaining northern spotted owl habitat across their range" (Franklin et al. 2021, p. 2). The Recovery Plan also emphasizes the need for action in Recovery Action 30: "Manage to reduce the negative effects of barred owls on northern spotted owls so that Recovery Criterion 1 can be met." Recovery Criterion 1 is to provide for a stable or increasing population trend of northern spotted owls throughout the range over 10 years (USFWS 2011, p. II-1). Therefore, the Strategy needs to allow for rapid implementation and result in swift reduction in barred owl numbers.

California spotted owls face a similar risk from barred owl competition as barred owl populations continue to expand southward. While California spotted owls have not yet experienced substantial declines as a result of competition from barred owls, the southward invasion of the barred owl has reached their range, and we expect additional impacts to California spotted owl populations would be inevitable without barred owl management. Invasive species are very difficult to remove once established. Therefore, the Strategy needs to focus on limiting the invasion of barred owls into the California spotted owl range. If barred owl populations do become established, the Strategy needs to provide for early intervention to prevent adverse effects of barred owls on California spotted owl populations.

ES 1.2 Description of the Proposed Action and Decision to be Made

The Service, in coordination with Federal, State, and Tribal partners across the range of the northern and California spotted owls, developed a proposed barred owl management strategy to address the threat to northern and California spotted owls from the invasive barred owl. The barred owl is protected under the Migratory Bird Treaty Act (MBTA; 16 U.S.C. 793 et seq.), which prohibits take (as defined at 50 CFR 10.12) of protected migratory bird species unless authorized by the Service in accordance with the MBTA and implementing regulations. Implementation of the proposed Strategy would require authorization of the take of barred owls under the MBTA. The preferred alternative includes the issuance of a Special Purpose permit under MBTA (50 CFR 21.95) and implementation of the proposed Strategy.

ES 1.3 Public Involvement

The Service initiated public scoping with the publication of the Notice of Intent (NOI) to prepare an EIS in the Federal Register on July 22, 2022. We requested comments from all interested parties on the scope of issues and alternatives to consider in preparing the EIS. The public comment period was open through August 22, 2022. We hosted a virtual public meeting on July 28, 2022. Chapter 5, Summary of Submitted Alternatives, Information, and Analyses and Appendix 5, Scoping Comment Summary, provide a summary of the comments received during the scoping period, which we considered when developing this EIS.

On November 17, 2023, the Service published the DEIS for evaluating the impacts on the human environment related to the proposed Strategy in the Federal Register (88 FR 80329), opening a 60-day comment period for public comments on both the proposed Strategy and the DEIS. Virtual public meetings were held on December 4 and December 14, 2023. Responses to public comments are provided in Appendix 6.

ES 2 Alternatives

The Final EIS evaluates the effects of a no action alternative (Alternative 1), and five action alternatives, including the proposed action, now identified as the preferred alternative (Alternative 2). All action alternatives include management actions to reduce barred owl populations in areas within the northern spotted owl range and to prevent establishment of barred owl populations within the California spotted owl range. Each of the action alternatives would authorize lethal removal of barred owls. The locations and relative priorities for removal would vary by alternative. The Service also considered but eliminated from detailed analyses several other alternatives and management approaches.

ES 2.1. Alternative 1 – No Action

Under the no action alternative, no systematic barred owl management strategy would be finalized or implemented, and the Service would not issue an MBTA permit for comprehensive management of barred owls. Ongoing barred owl removal as part of research efforts in California, and future research efforts that may be proposed anywhere in the range of the spotted owl would still occur.

ES 2.2. Elements Common to All Action Alternatives

The preferred alternative and each action alternative would provide different management frameworks for entities (Federal, State or Tribal government agencies, or private companies or individuals) to implement barred owl management. None of the alternatives would require any entity to implement barred owl management; rather they outline various combinations of management approaches, geographic areas, and other components that would allow for and guide management actions and the ability to prioritize areas of greatest need.

All action alternatives would include the issuance of a Migratory Bird Special Purpose permit (50 CFR 21.95) to the Service for the take of barred owls associated with the actions described in the alternatives. The Service could designate interested governmental and non-governmental entities to act under the permit.

Actions in areas where barred owl populations are well established focus on control and management of this invasive species. Actions in the California spotted owl range, and where barred owl populations are not yet established, focus on early detection and rapid response to invading barred owls. In either case, management of barred owls would be implemented over the long-term.

Analysis of effects of any of the action alternatives includes projecting potential future implementation actions by multiple entities. It is not possible to forecast the duration of the barred owl management activities themselves. The MBTA Special Purpose permit can be issued for up to three years, but can be renewed. For the purposes of the analysis of the action in this EIS, we chose a temporal scale of analysis of 30 years. This 30-year period allows sufficient time to predict and analyze discernable differences in effects to resources across alternatives.

Under all action alternatives, management of barred owl populations would be accomplished by lethally removing barred owls under the detailed protocol in Appendix 2. This protocol was developed based on time-tested field methods proven to be effective, efficient, and as humane as possible. All removal efforts would be monitored at the spotted owl site (territory), management block, province or area, and range-wide (northern and California spotted owls) scale. Designees under the MBTA permit would provide annual data from removal implementation areas. Information would be summarized in annual reports, and population trend analyses would be conducted approximately every five years.

ES 2.3. Alternative 2 – Preferred Alternative – Proposed Strategy Implementation

Under this alternative, within the northern spotted owl range, we would apply three approaches to barred owl management – 1) northern spotted owl site management (site management), 2) General Management Areas (GMAs) with their associated Focal Management Areas (FMAs), and 3) Special Designated Areas (Maps 2-2, 2-3, 2-4, and 2-5).

Site management would involve removing barred owls from within and around spotted owl sites, with priority given to recently occupied sites. The intent is to conserve remaining northern spotted owls while larger block management efforts (such as FMAs) are developed and implemented, allowing these spotted owls to recolonize larger blocks as barred owl populations decrease.

GMAs are large, mapped areas within which barred owl management would occur on smaller FMAs. These GMAs were developed, mapped, and prioritized at the physiographic province (province) scale with the assistance of an interagency, intergovernmental team, in keeping with the Recovery Plan's focus on maintaining viable northern spotted owl subpopulations within each province. FMAs would be established at the time of removal implementation, by the implementing agency/entity or a group of agencies/entities, based on general direction and prioritization provided in the alternative and in collaboration with the Service. The area under barred owl management within a province would be limited to 50 percent of the total area within the combined GMAs. We recommend FMAs be of a size capable of supporting 50 northern spotted owl pairs, where possible, to provide for development of a functional spotted owl population over time.

Special Designated Areas are intended to support specific identified needs, such as connectivity between larger GMAs, future contribution for spotted owl management efforts in Canada, Washington State's existing Spotted Owl Special Emphasis Areas, and management of early

barred owl invasions in the California Cascades Province and Sonoma and Marin Counties. Each has a specific description of barred owl management to meet the purpose of the area.

In the California spotted owl range, where we are focused on early detection and rapid response at the invasion front, Alternative 2 would focus on surveys, inventory, and monitoring to detect invading barred owls and rapid removal of any barred owls detected. This applies throughout the range of the California spotted owl.

ES 2.4. Alternative 3 – Management Across the Range

Alternative 3 would allow for barred owl management to be implemented anywhere within the range of the northern or California spotted owls or within 15 miles of the range of the subspecies on up to 50 percent of the total area (Map 2-6). There would be no specific requirements for size or location of barred owl management areas under this alternative.

ES 2.5. Alternative 4 – Limited Management by Province/Population

Within the northern spotted owl range, Alternative 4 would focus barred owl management on a single large GMA within each province (Map 2-7), thereby supporting a single, though larger, spotted owl population in each province. In the California spotted owl range, barred owl management would be delayed until detections reached 10 percent of surveys in areas within the Sierra Nevada portion of the California spotted owl population, or 5 percent within the Coastal-Southern California portion of the California spotted owl population. This would allow barred owl populations to be established but would remove those populations before they can substantially impact spotted owls.

ES 2.6. Alternative 5 – Management Focused on Highest Risk Areas

In the northern spotted owl range, Alternative 5 would focus barred owl management in the northern provinces, where the subspecies is at greatest risk of extirpation from barred owl competition (Map 2-8). Management of barred owls could be conducted on 100 percent of two GMAs in the Eastern Washington Cascades, Western Washington Cascades, Eastern Oregon Cascades, Western Oregon Cascades, and Oregon Coast Ranges Physiographic Provinces and one GMA in the Olympic Peninsula Physiographic Province. In the California spotted owl range, under this alternative, barred owl management would be limited to the northern Sierra Nevada portion of the subspecies range. This is the area where the barred owl invasion initially occurred and represents the most likely pathway for larger numbers of barred owls to invade the California spotted owl range.

ES 2.7. Alternative 6 – Management Focused on Best Conditions

In the northern spotted owl range, Alternative 6 would focus barred owl management in the southern portion of the northern spotted owl range, where spotted owl populations have not decreased to the degree they have in the north (Map 2-9). Management of barred owls could occur on up to 75 percent of each GMA in the Oregon Klamath, California Coast, California Klamath, and California Cascades Physiographic Provinces. In the California spotted owl range,

under this alternative, barred owl management would be focused on areas with the best remaining habitat and areas with higher fire resiliency, including 50 percent of the Sierra Nevada portion of the range and 75 percent of the Coastal-Southern California portion of the range.

ES 3 Environmental Consequences

In this FEIS, we conducted an analysis of the potential effects of each alternative to barred owls, spotted owls, other wildlife species, recreation and visitor use, wilderness, socioeconomics, and climate change, as well as cumulative effects. Effects to other resources were considered but dismissed from detailed analysis because there are not likely to be significant effects from the proposed action or alternatives. These resources include public health and safety, cultural resources, Tribes, ethical considerations, environmental justice, or geology, soils, water, vegetation, or air quality.

ES 3.1 Effects to Barred Owls

Alternative 1, the no action alternative, would have no significant effect on barred owl populations. All the action alternatives would have some level of adverse effect on barred owls through the removal of barred owls from management areas.

In the northern spotted owl range, Alternative 3 would have the greatest adverse impact on barred owl populations due to the large area under removal activities. Alternative 6 would have the lowest adverse effect on barred owl populations because barred owl removal would be focused on the southern portion of the northern spotted owl range which has the lowest density of barred owls at this time, resulting in fewer barred owls being removed per area. However, this alternative would not result in removal of barred owls in the northern two thirds of the northern spotted owl range and would have no significant effect on barred owls in those areas. Both Alternatives 5 and 6 would leave large portions of the northern spotted owl range without barred owl management.

In the California spotted owl range, Alternative 4 would result in the most barred owls removed, but would also allow for the establishment of barred owl populations. The increase in barred owls would result in more barred owls being removed once barred owl management intervention began. Other than the no action alternative, Alternative 5 would result in the fewest barred owls removed due to the limitation of removal to a portion of the northern Sierra Nevada area. However, outside of this area, barred owls would potentially establish populations, and could offset the effect of removals in the north.

ES 3.2 Effects to Spotted Owl

Alternative 1, the no action alternative, would have the greatest indirect adverse effect on spotted owls, because it would result in the greatest decline in northern and California spotted owl populations from barred owl competition.

Alternative 2 would result in the greatest increase in northern spotted owl populations, in part due to the focus on managing recently occupied sites in addition to management areas, and would also have a substantial beneficial effect on California spotted owls with the removal of barred owls throughout the range of the subspecies and potential invasion pathways. Alternative 3 has the greatest area of barred owl removal, but somewhat lower benefits to northern spotted owl populations due to the lack of focus on high priority areas. The added monitoring and removal in buffer areas would result in an increased beneficial effect on California spotted owls. Alternative 4 would have a smaller but positive effect on northern spotted owls due to the restriction of barred owl management areas with each province, and an adverse effect on California spotted owls by allowing barred owls to establish populations before removal effort are initiated.

Alternatives 5 and 6 do not include barred owl management in portions of the northern spotted owl range, leading to adverse effects in these areas; beneficial effects would occur in areas where barred owls are removed. Alternative 5 would have an adverse effect on a large portion of the California spotted owl population because barred owl removal is limited to the northern Sierra Nevada and barred owl populations could become established in the unmanaged areas. Alternative 6 would have an overall adverse effect in the California spotted owl range because not all areas are included, leaving room for barred owl populations to be established.

ES 3.3 Effects to Other Wildlife Species

Barred owls are a generalist non-native predator that exert pressure on species not adapted to this new source of predation, leading to negative effects on potential prey species and competitors for the prey. Barred owl removal in the northern spotted owl range would have a beneficial effect on potential prey species by reducing this novel source of predation and on potential competitors by reducing competitive pressure. Barred owl removal in the California spotted owl range would prevent negative effects of barred owl predation and competition by preventing the establishment of barred owl populations in the areas described in the alternatives. The specific species affected would vary by location of barred owl management.

The act of removing barred owls involves discharge of shotguns. If barred owls are removed very near nesting murrelets during critical periods of the nesting cycle, these activities could have a small, but adverse effect on marbled murrelets through disturbance. The potential degree of this impact at the marbled murrelet population level depends on the area of removal activity that overlaps the range of the murrelet. This would be lowest under Alternative 6 and limited to the southern portion of the murrelet's range. The potential impact would be greatest under Alternative 3 due to the large overlap with marble murrelet habitat in Washington, Oregon, and California. Other species are unlikely to be significantly disturbed by the limited noise created during barred owl removal.

ES 3.4 Effects to Recreation and Visitor Use

Alternative 1, the no action alternative, would have no effect on recreation and visitor use. The primary adverse effect of the action alternatives on recreation and visitor use would be the potential disturbance to users from the sound of gunshots, resulting in changes to the soundscape.

On areas where hunting or target shooting are allowed, we anticipate no significant disturbance from the sound of gunshots, particularly during hunting seasons, as these are part of the background soundscape. On areas where hunting and target shooting are not allowed, the sound of gunshots would adversely affect some users. These areas include most National and State Parks. The primary difference between alternatives would be the number and location of areas closed to firearm use where barred owl removal would occur, including the National Park units.

ES 3.5 Effects to Wilderness

Alternative 1, the no action alternative, would have no effect on most aspects of wilderness character, but an adverse effect on the natural quality of wilderness because native northern and California spotted owl populations would continue to decline or be locally extirpated while barred owls persist or increase in wilderness. Action alternatives would have a negative effect on several aspects of wilderness character as a result of manipulation of wildlife populations, presence of crews, and presence of unnatural soundscapes (gunfire). The placement of Automated Recording Units within the wilderness would have a small but negative effect on undeveloped quality. All action alternatives would also have a positive effect on natural quality of wilderness because native northern and California spotted owl populations would stabilize and potentially increase. The extent, location, and intensity of these effects would vary by alternative, depending on the area included in barred owl management.

ES 3.6 Effects to Socioeconomics

Barred owl management would allow spotted owl populations to stabilize and increase, recolonizing management areas where they have been previously excluded by barred owls. This would be unlikely to have any effect on most aspects of the diverse economy of the West Coast (Washington, Oregon, and California), with the possible exception of timber harvest and associated revenues, income, and employment. Therefore, our analysis is focused on impacts to timber harvest.

The projected increases in spotted owl site occupancy would likely be slow and small in most areas, apart from areas of northern California with low barred owl populations. Increases would also likely occur where high quality habitat is available, which is concentrated on Federal lands in most provinces, and often within reserve areas on these lands.

We anticipate there would be little, if any, indirect effect on regional timber harvest on Federal lands, based on the history and underlying designations of Federal land management. Over time, as northern spotted owl subpopulations rebound inside managed areas and the resiliency of these individuals and subpopulations increases, we expect Federal agencies may have more flexibility relative to forest management impacts on spotted owls. On State lands, existing land management plans and Habitat Conservation Plans (HCPs) would greatly reduce the potential for conflict between timber production and reoccupied spotted owl sites.

In Washington State, the projected limited increase in occupied spotted owl sites and extensive Federal lands currently reserved from commercial timber harvest would result in a very low to

negligibly small potential for impacts to timber harvest across all action alternatives. In Oregon, the potential for impacts on timber harvest levels would be generally low due to the low level of increase in spotted owl occupied sites and the high percentage of spotted owl habitat on Federal lands, including large areas of reserved lands. The potential for barred owl management at some spotted owl sites to impact private land timber harvest is slightly higher in Alternatives 2 and 4 in the Oregon Coast Ranges province and Alternatives 2 and 6 in the Oregon Klamath province. The limited requirements for management around spotted owl sites under Oregon Forest Practices Rules would reduce the potential impact to a very low level.

In northern California, a substantially higher percentage of spotted owl habitat is found on private lands. Where these lands are covered by HCPs covering spotted owls, and where barred owls have recently displaced spotted owls from known sites that are still being managed as occupied under California regulations, we would anticipate no change in timber harvest levels as a result of barred owl management. Barred owl management would not occur in northern California under Alternative 5, limiting spotted owl populations. Potential impacts to private land timber harvest would be greatest in Alternative 2 in the California Coast province, given the larger increase in occupied/reoccupied spotted owl sites on private lands.

ES 3.7 Effects to Climate Change

Given the nature of the proposed action and alternatives analyzed in this EIS, the negligibly small contribution of additional greenhouse gas (GHG) emissions associated with any of the alternatives, and the data available, the Service determined that a quantitative analysis of GHG emissions was not appropriate. Alternative 1, the no action alternative, would have no effect on climate change, as no barred owl management actions would be conducted that could contribute GHG emissions. Under all action alternatives, the primary potential effect on climate change is GHG emissions associated with the use of motorized vehicles for the survey and removal of barred owls. Under all action alternatives these actions would be conducted as part of ongoing forest or land management activities, which already involve the use of vehicles as needed, and the addition of barred owl management is not anticipated to significantly increase the vehicle use. Thus, additional emissions would be low. Overall, any effects on regional GHG emissions or global climate change resulting from the proposed alternatives would be negligibly small. Thus, the Service has not attempted to conduct an in-depth or quantitative analysis of effects of the action alternatives on global climate change.

Chapter 1 - Introduction and Purpose and Need for the Action

We, the U.S. Fish and Wildlife Service (Service), have developed a proposed Barred Owl Management Strategy (Strategy) to address the threat of the non-native, invasive barred owl (*Strix varia*) to the native northern and California spotted owls (*Strix occidentalis*). Implementation of the proposed Strategy would require the take of barred owls and the issuance of a permit under the Migratory Bird Treaty Act (MBTA). This action is necessary to support the survival and recovery of the threatened northern spotted owl (*Strix occidentalis caurina*) and avoid substantial impacts to the California spotted owl (*Strix occidentalis occidentalis*) populations from barred owl competition. This FEIS was prepared in accordance with the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] 4321 et seq.) to analyze the environmental impacts of the proposed Strategy and the associated MBTA take authorization, as well as alternatives to the Strategy, including a no action alternative.

We developed this FEIS in accordance with NEPA as amended by the Fiscal Responsibility Act of 2023, and in accordance with implementing regulations in effect in 2023 (i.e., Council on Environmental Quality (CEQ) regulations at 40 CFR Parts 1500-1508 as amended April 20, 2022, 87 FR 23453, and the Department of Interior NEPA regulations at 43 CFR Part 46). We also considered the regulatory changes proposed by CEQ on July 31, 2023 (88 FR 49924), which were finalized by CEQ on May 1, 2024 (89 FR 35422). Although we believe this FEIS is consistent with the regulatory changes adopted, by their terms they are not required to be applied to NEPA processes that began before July 1, 2024 (see 40 CFR 1506.12)(2024). As such, citations to CEQ regulations in this FEIS are to the regulations in effect before the 2024 revisions.

1.0 Changes between Draft and Final EIS

1. Added information on public involvement following publication of the DEIS.
2. Added Animal and Plant Health Inspection Service - Wildlife Services as a Cooperating Agency under NEPA

1.1 Background

Spotted owls are native to western North America. Of the three identified subspecies, two are the subject of this action, the northern spotted owl and the California spotted owl (Map 1-1). Both subspecies select structurally diverse forests with larger trees and moderate to dense canopy closure for nesting, with more variable habitat acceptable for foraging.

Northern spotted owls were historically found in the western forests of southwest British Columbia through Washington and Oregon to northwestern California south to Marin County. Northern spotted owls still occupy most of this range, though in very low densities in some areas. The California spotted owl is found in the Sierra Nevada Mountains, the mountains of central coastal California, and the peninsular and transverse ranges of southern California, with a distinct geographic separation between the Sierra Nevada and Coastal-Southern California populations (Verner et al. 1992, p. 4).

Map 1-1: Range of the northern and California spotted owl.

The Service listed the northern spotted owl as a threatened species under the Endangered Species Act (ESA) on June 26, 1990 (55 FR 26114). The primary reason for listing the northern spotted owl was the widespread loss of subspecies' habitat across its range and the inadequacy of existing regulatory mechanisms to conserve the northern spotted owl. On December 15, 2020, we published a 12-month finding (85 FR 81144), in which we announced that reclassification of the northern spotted owl from a threatened species to an endangered species was warranted but precluded by higher-priority actions. On June 27, 2023, we affirmed that reclassification of the northern spotted owl to endangered is warranted but precluded; proposed rules to reclassify threatened species to endangered are a lower priority than listing currently unprotected species (i.e., candidate species), since species like the northern spotted owl currently listed as threatened are already afforded the protection of the ESA and implementing regulations. (88 FR 41560, 41578). The primary stressors affecting the northern spotted owl's current biological status include lag effects of past habitat loss, continued timber harvest, wildfire, and competition from non-native northern barred owls (*Strix varia varia*) (barred owl), which is currently the stressor with the largest negative impact on northern spotted owls (88 FR 41578). The spotted owl is also protected by the MBTA.

The Service proposed the California spotted owl for listing on February 23, 2023 (88 FR 11600). The Sierra Nevada Distinct Population Segment (DPS) of the California spotted owl was proposed for listing as threatened due to the impact of high-severity fire, tree mortality, drought, and barred owls. The Coastal-Southern California DPS was proposed for listing as endangered due to continuing population declines, fragmented habitat, risk of high severity fire, tree mortality, and drought.

Barred owls are native to eastern North America. They began to expand their range around 1900, concurrent with European settlement and facilitated by the subsequent human-caused changes to the northern Great Plains and northern boreal forest. Barred owls arrived in the Pacific Northwest in the early 1970s, establishing populations in northern Washington in the early 1980s. They continued to spread southward in the Cascades and coastal mountains, building dense barred owl populations behind the invasion front (See Appendix 1 for more details).

While barred owls prefer the same older, structurally diverse forest type selected by spotted owls, barred owls can utilize a wider range of forested habitat types than spotted owls,

including wooded urban areas and large tracts of second-growth forests. In addition, barred owls are generalist predators, utilizing a much wider variety of prey items than the specialist spotted owls. Barred owls consume the same nocturnal arboreal rodents that are the focus of the spotted owls' diet, and in large quantities given their dense populations (Baumbusch 2023, entire; Kryshak et al. 2022, entire; Wood et al. 2020, entire). They also consume numerous other species, including other mammals, amphibians, insects, crayfish, and mollusks. Because of their larger size, adaptability to a wide variety of forested habitats, and ability to eat a wide variety of prey, barred owls often occur in denser populations, outcompeting and excluding spotted owls from the latter's preferred habitats.

The Service has concluded that the barred owl in western North America meets the definition of an invasive species under Executive Order 13751 for the following reasons (a full description of this analysis is contained in Appendix 1):

- The barred owl is not native to the range of the northern and California spotted owls.
- Barred owls were introduced unintentionally through dissemination across the previous barrier to the movement of this forest owl created by the generally treeless conditions of the northern Great Plains and harsh conditions of the northern boreal forest in Canada. This movement was made possible by human-caused changes to the northern Great Plains and northern boreal forest.
- Barred owls are causing significant environmental harm to northern spotted owls, a subspecies listed as threatened under the ESA, and are likely to cause significant harm to California spotted owls as barred owl populations continue to expand.
- Barred owls are also likely harming other species and may to create a trophic cascade in some forest systems. In other words, the addition of barred owls to a new ecosystem has the potential to alter the food web in ways that could cause local extirpations of competitors or prey, and even affect fundamental ecosystem processes like the transfer of nutrients between fungi, plants, and animals (Holm et al. 2016, pp. 6-7).

By 2004, the Service had identified competition from barred owls as a primary threat to northern spotted owl populations (USFWS 2004, 9. 43). Since then, the effects of barred owls have become more apparent. Based on a recent demographic meta-analysis, northern spotted owl populations in the northern half of the subspecies' range have dropped by over 75 percent in two decades and continue to decline at greater than 5 percent per year, primarily due to barred owls (Franklin et al. 2021, pp. 11-13). Without management of barred owls and the maintenance of suitable habitat, extirpation of northern spotted owls from major portions of their historical range is likely in the near future (Franklin et al. 2021, p. 19).

In recent years, barred owls have penetrated into the range of the California spotted owl in the Sierra Nevada Mountains, although the barred owl population generally remains low and scattered in most of the California spotted owl range at this time. A small but rapidly expanding population of barred owls was established in the northern Sierra Nevada by 2017 (Wood et al 2020, p. 4). The bulk of those barred owls and associated spotted/barred owl hybrids were removed during a research study between 2018 and 2020 (Hofstadter et al 2022, p. 282). While barred owls have not substantially impacted California spotted owl populations to date, the establishment of the barred owl population in the northern Sierra Nevada, and the history of the

invasion and impacts of barred owls on northern spotted owls following such expansion, supports the assumption that, unless the barred owl populations are managed, barred owls will continue to invade southward until barred owls impact California spotted owl populations.

The Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, entire) (Recovery Plan) identifies past habitat loss, current habitat loss, and competition from recently arrived barred owls as the most pressing threats to the northern spotted owl (USFWS 2011, p. I-6.). Recovery Criterion 1 of the Recovery Plan is focused on reaching a stable population trend for northern spotted owls, specifically targeting a stable or increasing overall population trend of northern spotted owls throughout their range over 10 years, as measured by a statistically reliable monitoring effort (USFWS 2011, p. II-1). Recovery Action 30 is to implement the results of research to adaptively manage the effects of barred owls to meet Recovery Criterion 1, informed by the results of Recovery Action 29: a large-scale barred owl control experiment (USFWS 2011, pp. III-65 to 66). In the proposed listing of the California spotted owl, the Service similarly concluded ". . . barred owls are a significant threat to the persistence of California spotted owls, and we expect the magnitude of the threat to increase into the foreseeable future, particularly if management efforts are not continued" (88 FR 11600 at 11619).

Habitat protection and management remain an important component of the conservation and recovery of the northern spotted owl. Under the Northwest Forest Plan and subsequent land management plan amendments, the Bureau of Land Management, U.S. Forest Service, and other partners have significantly slowed the loss of northern spotted owl habitat on Federal lands from timber harvest, providing highly valuable contributions to the habitat component of the recovery of spotted owls. The 2019 California Spotted Owl Conservation Strategy outlines numerous conservation measures that are being incorporated into ongoing planning efforts for that subspecies. State land use plans and HCPs have likewise addressed habitat conservation. However, there are no existing comprehensive tools to address the threat to spotted owls from barred owl competition. This Strategy represents such a tool.

In 2013, the Service initiated the Barred Owl Removal Experiment (Removal Experiment), implementing Recovery Action 29 for the northern spotted owl (USFWS 2011, p. III-65) to investigate the effect of barred owl removal on northern spotted owl population dynamics. The Removal Experiment, conducted in four study areas in Washington, Oregon, and northern California, used paired treatment areas (barred owl removal) and control areas (no barred owl removal), to test whether barred owl removal could reverse declining northern spotted owl population trends in study areas with differing environmental conditions. The removal of barred owls had a strong, positive effect on survival of northern spotted owls and a weaker, though still positive, effect on northern spotted owl dispersal and recruitment (Wiens et al. 2021, entire). In the treatment areas where barred owls were removed, northern spotted owl populations stabilized after three to six years of removal. In paired control areas without barred owl removal, northern spotted owl populations continued to decline at 12 percent per year over the same time period. The Removal Experiment demonstrated that barred owl removal can be an effective method contributing to the conservation of northern spotted owls. Additional barred owl removal studies conducted in California showed similar results (Hofstadter et al. 2022, entire).

1.2 Purpose and Need for the Proposed Action

The purpose of this action is to reduce barred owl populations to improve the survival and recovery of northern spotted owls and to prevent declines in California spotted owls from barred owl competition. Relative to northern spotted owls, the purpose is to reduce barred owl populations within selected treatment areas in the short term and increase northern spotted owl populations in those treatment areas. Relative to the California spotted owl, the purpose is to limit the invasion of barred owls into the range of the subspecies and provide for a rapid response to reduce barred owl populations that may become established.

The need for this action is to address the effect of competition from barred owls on northern and California spotted owls. Competition from barred owls is a primary cause of the rapid and ongoing decline of northern spotted owl populations. Due to the rapidity of the decline, it is critical that we manage barred owl populations to reduce their negative effect before northern spotted owls are extirpated from large portions of their native range. As stated in the recent northern spotted owl demographic meta-analysis: "[N]orthern spotted owl populations potentially face extirpation if the negative effects of barred owls are not ameliorated while maintaining northern spotted owl habitat across their range" (Franklin et al. 2021, p. 2). The Recovery Plan also emphasizes the need for action in Recovery Action 30: "Manage to reduce the negative effects of barred owls on northern spotted owls so that Recovery Criterion 1 can be met." Recovery Criterion 1 is to provide for a stable or increasing population trend of northern spotted owls throughout the range over 10 years (USFWS 2011, p. II-1). Therefore, the Strategy needs to allow for rapid implementation and result in swift reduction in barred owl numbers.

California spotted owls face a similar risk from barred owl competition as barred owl populations continue to expand southward. While California spotted owls have not yet experienced substantial declines as a result of barred owl competition, the southward invasion of the barred owl has reached their range, and we anticipate that additional impacts to California spotted owl populations would be inevitable without barred owl management. Invasive species are very difficult to remove once established. Therefore, the Strategy needs to focus on limiting the invasion of barred owls into the California spotted owl range. If barred owl populations do become established, the Strategy needs to allow for early intervention to prevent adverse effects of barred owls on California spotted owl populations.

1.3 Proposed Federal Action and Decision to Be Made

Using information from the Removal Experiment and other applicable studies and research findings, the Service, in coordination with Federal, State, and Tribal partners across the range of the northern and California spotted owls, developed a barred owl management strategy. The proposed Strategy is limited to addressing the threat from the barred owl. Other threats, such as habitat loss, are being addressed through other processes and efforts (See Section 1.1).

The barred owl is protected under the MBTA (16 U.S.C. 793 et seq.) see 50 CFR 10.13 (list of MBTA species). The MBTA prohibits take (as defined at 50 CFR 10.12) of protected migratory bird species unless authorized by the Service in accordance with the MBTA and implementing

regulations. Implementation of the proposed Strategy would require a permit or other authorization under the MBTA.

The proposed action is the issuance of a Migratory Bird Special Purpose permit under MBTA (50 CFR 21.95) (hereafter referred to as "Special Purpose permit") and implementation of the proposed Strategy. To issue a Special Purpose permit, the Service must determine whether the application is complete (as defined in 50 CFR 13.12) and the activity meets the general permit issuance criteria and requirements (50 CFR 13.21), as well as the specific requirements for a special purpose permit (50 CFR 21.95). Permits are issued for up to three years but may be renewed after each three-year period as long as general permit requirements are met.

The Service's Regional Director of the Pacific Region will decide whether to authorize take of barred owls under the MBTA and implement a comprehensive barred owl management strategy as described in the preferred alternative or another analyzed alternative, or to select the no action alternative and not issue the MBTA take authorization or implement barred owl management. The Service will also complete an intra-Service consultation under Section 7 of the ESA prior to a Record of Decision and permit issuance, addressing the potential effects to northern spotted owls and any other ESA-listed that may be affected by the proposed action.

The proposed Strategy is considered a Federal action under NEPA. This FEIS was prepared to evaluate the effects on the human environment related to the proposed Strategy, as well as a reasonable range of alternatives, including a no action alternative. In assessing the appropriate level of NEPA review, we chose to develop an EIS in part due to the large scale of the affected area across three States and potential impacts to ESA listed species. The Service is the lead Federal agency responsible for preparing the EIS, and there are 11 cooperating agencies:

1. Bureau of Land Management - Oregon
2. Bureau of Land Management - California
3. National Park Service
4. United States Forest Service
5. Washington Department of Fish and Wildlife
6. Washington Department of Natural Resources
7. Oregon Department of Fish and Wildlife
8. Oregon Department of Forestry
9. California Department of Fish and Wildlife
10. California Department of Forestry and Fire Protection
11. Animal and Plant Health Inspection Service - Wildlife Services

Designation as a cooperating agency does not imply that the agency supports the proposed Strategy or other alternatives that may be developed, and participation as a cooperating agency does not diminish or otherwise modify the agency's independent statutory obligations and responsibilities under applicable Federal laws. Further, participation as a cooperating agency does not imply any future commitment of resources based on the Record of Decision and is not an agreement to carry out any specific actions in the future.

1.4 Public Involvement

Notice of Intent to Prepare an EIS. On July 22, 2022, the Service initiated a public scoping process for this EIS by publishing a Notice of Intent (NOI) in the Federal Register (87 FR 43886). We requested comments from all interested parties on the scope of issues and alternatives to consider in preparing the EIS. The public comment period was open through August 22, 2022. We provided information at a virtual public meeting on July 28, 2022.

The Service received 37 written comments from 22 different organizations (including Tribes and governmental entities, environmental, conservation, animal welfare, and industry groups, professional societies, and zoological parks) and 15 individuals. Chapter 5 and Appendix 5 summarize submitted alternatives, information, and analyses received during the scoping period, which the Service considered when developing this EIS. The full contents of all scoping comments are available on Regulations.gov under the docket R1-ES-2022-0074-0001.

Draft EIS. On November 17, 2023, the Service published notice of availability for the DEIS, which evaluated the impacts on the human environment related to the proposed Strategy, in the Federal Register (88 FR 80329), opening a 60-day comment period for public comments on both the proposed Strategy and the DEIS. Virtual public meetings were held on December 4 and December 14, 2023. The public comment period closed January 16, 2024.

The Service received 8,613 comment letters on these documents through Regulations.gov, including 8,155 which were based on a single template letter. We received 39 comments from government agencies and organizations, including Federal, State and County governmental agencies, environmental, conservation, animal welfare, and industry groups. We received 8,574 comments from individuals. Chapter 5 briefly summarizes submitted alternatives, information, and analyses received during the comment period. Responses to public comments are provided in detail in Appendix 6. The full contents of all DEIS comments are available on Regulations.gov under the docket FWS-R1-ES-2022-0074-0048.

1.5 Other Permits and Determinations

In addition to compliance with the ESA and MBTA discussed above, compliance with Section 106 of the National Historic Preservation Act (as amended) is required for all Federal undertakings. In this case, the undertaking is the Service's proposed issuance of an MBTA permit and implementation of the Strategy.

Depending on the location and landowners involved in implementation of the Strategy, barred owl management could require additional Federal and State permits. This FEIS could serve as the NEPA documentation for issuance of other Federal permits as needed, where this FEIS addresses the relevant effects and meets the needs of the permitting agencies. Use of this FEIS for such issuance would be at the discretion of the responsible agency. Washington, Oregon, and California may also require permits or authorizations for the management of barred owls. The Service is working with the States and will apply for any necessary State permits.

Chapter 2 - Alternatives

This chapter describes the alternatives analyzed in detail in this FEIS and the alternatives considered but eliminated from detailed analysis.

The Service developed these alternatives in coordination with the interagency, intergovernmental team assisting with development of the Strategy (including representatives from Federal, State, and Tribal governments in Washington, Oregon, and California) and the cooperating agencies under NEPA described above, informed by the comments we received during the scoping process.

2.0 Changes between Draft and Final EIS

- Provided additional information on the prevalence and effect of spotted x barred owl hybrids.
- Designated Alternative 2 as the preferred alternative.
- Expanded Section 2.3.3 Prioritization to clarify the approach and intended use of the priority ratings in Alternative 2.
- Revised Alternative 2, simplifying the approach to distributing barred owl management within each province to provide additional flexibility for implementation. Added potential spotted owl site management in the Western Washington Lowlands physiographic province.
- Modified some GMA boundaries.
- Removed GMAs and added Special Designated Areas in the California Cascades province in the range of the northern spotted owl. Revised all data tables to reflect the boundary changes.
- Clarified Alternative 2 in the California spotted owl range. Revised maps of the potential invasion pathways and clarified the priorities for monitoring and barred owl management in the range of the of the California spotted owl.
- Revised Alternatives 2, 4, 5, and 6 associated with changes to the boundaries of GMAs and the Special Designated Areas in the California Cascades province.

2.1 Considerations Used in Developing the Alternatives

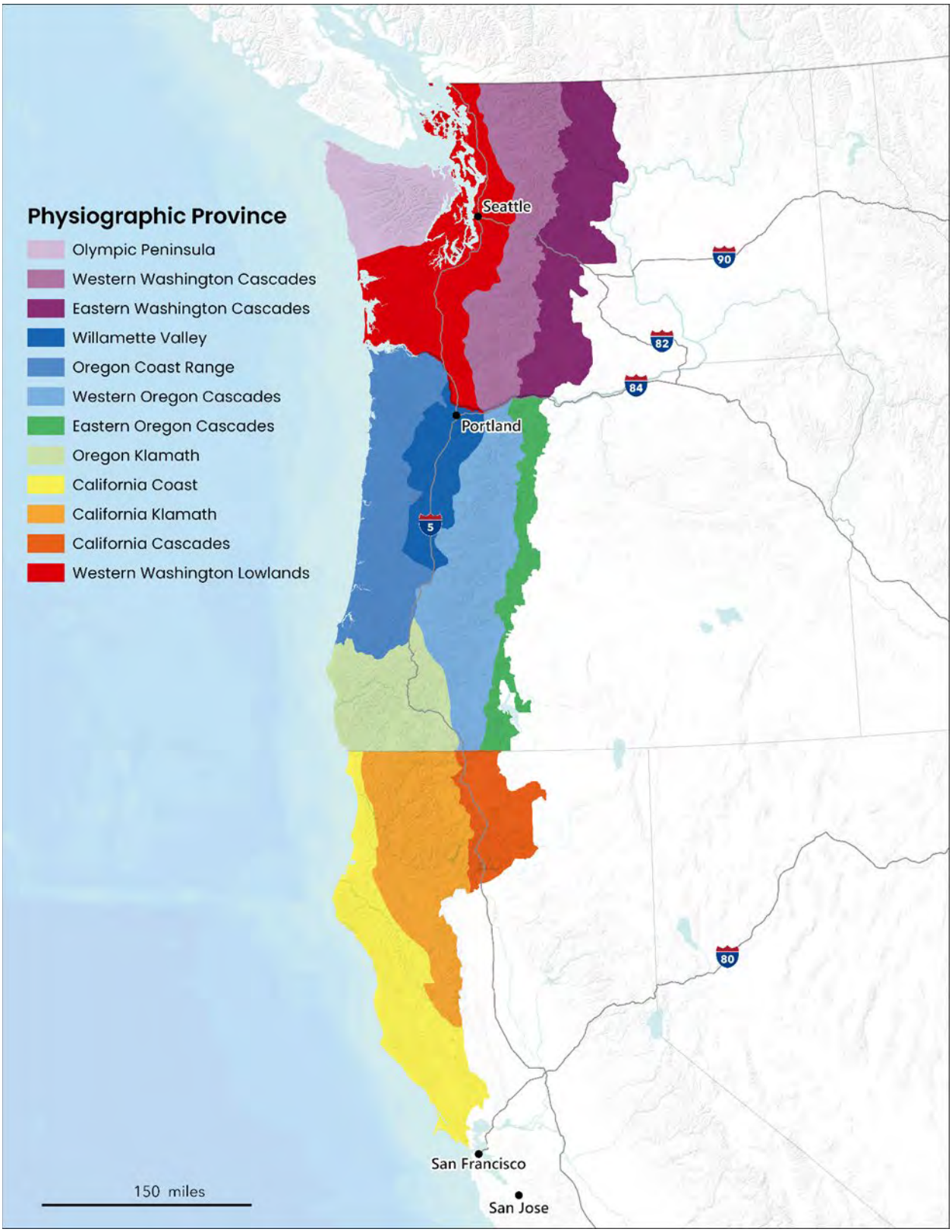
We developed five action alternatives, based on an array of considerations. These considerations included suggested alternatives and other concepts we received during the scoping process (see Chapter 5), our own internal analyses, and input from cooperating agencies. These action alternatives span a reasonable range of alternatives that are technically and economically feasible and meet the Purpose and Need described in Section 1.2.

Given the differences in conditions and specifically the status of barred owls between the northern and California spotted owl ranges, as described in the Purpose and Need, each alternative contains specific elements for each subspecies. For the northern spotted owl range, barred owl management alternatives are described at the physiographic province level (Map 2-1) to ensure consideration across the range of the subspecies. In the California spotted owl range,

alternatives are described at the population level, including the Sierra Nevada and Coastal-Southern California populations.

We analyzed the no action alternative and five action alternatives, including the preferred alternative (Alternative 2). All action alternatives analyzed in detail would include management to reduce barred owl populations in areas within the northern spotted owl range and to prevent establishment of barred owl populations within the California spotted owl range. Each of the action alternatives would authorize lethal removal of barred owls. The locations and relative priorities for removal would vary by alternative. Each action alternative contains appropriate mitigation measures to avoid, minimize, and mitigate adverse impacts to the human environment.

- Alternative 1: No Action
- Alternative 2: Preferred Alternative – Strategy Implementation
- Alternative 3: Management Across the Range
- Alternative 4: Limited Management by Province/Population
- Alternative 5: Management Focused on Highest Risk Areas
- Alternative 6: Management Focused on Best Conditions



Map 2-1. – Physiographic provinces in the northern spotted owl range

2.2 Alternative 1 – No Action

NEPA requires that the Federal agency consider impacts of a no action alternative, which serves as a baseline with which to compare impacts of the proposed action and any action alternatives. We also include an analysis of negative environmental impacts of not implementing the proposed agency action. Under the no action alternative, no systematic barred owl management strategy would be finalized or implemented, and the Service would not issue an MBTA permit for take of barred owls. Ongoing barred owl removal on research efforts in California and future research efforts that may be proposed anywhere in the range of the spotted owl would still occur.

2.3 Elements Common to All Action Alternatives

Each action alternative would provide different management frameworks for entities (Federal, State, and Tribal government agencies, or private companies and individuals) to implement barred owl management. None of the alternatives would require any entity to implement barred owl management; rather they outline various combinations of management approaches, geographic areas, and other components that would allow for and guide management actions and the ability to prioritize areas of greatest need.

Management of barred owls described in the action alternatives would only be conducted on lands of willing landowners or land managers, including Federal, State, Tribal, and local governmental agencies, and private landowners. Presence of an area within the mapped confines or description of the proposed action or any action alternative would not convey any additional rights or requirements to the implementing entities.

The alternatives could be applied across all ownerships, but are not a replacement for, and would not result in any change in, land management as included in current land use plans or agreements, and would not make any changes to existing plans or agreements. The actions described can generally be applied in concert with existing land management.

All action alternatives would include the issuance of a Migratory Bird Special Purpose permit (50 CFR 21.95) to the Service for the take of barred owls associated with the actions described in the alternatives and for the number of barred owls described in Section 3.3 Barred Owl. Special Purpose permits are issued for three years and can be renewed. The Service could designate interested governmental and non-governmental entities to act under the permit, in accordance with the Record of Decision.

Under 50 CFR 21.95, a Special Purpose permit may be issued to an applicant who submits a written application containing the required information and makes a sufficient showing of benefit to the migratory bird resource, important research reasons, reasons of human concern for individual birds, or other compelling justification. Upon receipt of a properly executed application for a permit, the Service is required to make a decision. The Service must ensure that its permit decision is consistent with the MBTA, its underlying treaties, and implementing regulations, and that it complies with all other applicable Federal laws and regulations. The permit type may change in the future based on regulatory updates. The MBTA gives the

Service broad authority to protect birds, but also to regulate their taking as long as their conservation is assured; in issuing the permit, the Service must ensure that authorized take would not potentially threaten wildlife or plant populations (50 CFR 13.21(b)(4)).

2.3.1 Barred Owl Population Management

In managing invasive species, there are two general approaches depending on the progression of the invasion. At the advancing front where few individuals are present, management is focused on early detection and rapid response to remove the invaders. Once invasive species are established, the focus is on control and management. In the California spotted owl range, and the very southern tip of the northern spotted owl range in Marin and Sonoma Counties, barred owls are at the early stages of invasion and as described in the Purpose and Need (Section1.2), an early detection and rapid response approach is appropriate. In the remainder of the northern spotted owl range, barred owls are well established, and a control and management approach is needed. In each action alternative, we describe a control and management approach on specific defined areas.

Under all action alternatives, management of barred owl populations would be accomplished by lethally removing barred owls, thereby reducing or eliminating barred owl populations. Removal will focus on territorial barred owls that defend their territories from other barred or spotted owls. Barred owl management would include removal of spotted/barred owl hybrids, though the removal protocol for hybrids would be more restrictive to further reduce risk of accidentally injuring or killing a spotted owl (See Section 2.3.1.1).

Removal methods are designed to:

- Reduce the number of territorial barred owls on the barred owl management area to a minimum. While the intention would be to remove all barred owls from a management area, we know that accessibility, weather, and other limitations, and well as an influx of barred owls from outside of the management area, would likely prevent this from happening. We do anticipate that removal would reduce and maintain barred owl populations at levels lower than would occur without barred owl management.
- Be as quick and humane as possible within the confines of the method.
- Pose little to no risk of removal or injury to non-target species, including the spotted owl.

We considered potential approaches for reducing barred owl populations and their effect on northern spotted owls. To meet the purpose and need, methods for managing barred owl should result in 1) the rapid removal of territorial barred owls from management areas in the short term within the northern spotted owl range, and 2) limit the invasion of barred owls into the California spotted owl range. Lethal removal of barred owls is the only population reduction method that has been proven to work in reducing barred owl populations, thereby improving spotted owl population response (Diller et al. 2016, entire; Wiens et al. 2021, entire; Hofstadter et al. 2022, entire). Alternatives that would employ other, nonlethal methods were considered, but not analyzed in detail because they would not meet the purpose and need (See Section 2.4.). Therefore, all action alternatives include the lethal removal of barred owls.

Lethal removal would be accomplished by broadcasting recorded barred owl territorial calls, which attract territorial barred owls, and shooting barred owls that respond and approach closely. The protocol for removal would be identical under the preferred alternative and all action alternatives (Appendix 2). This protocol is based on the experience gathered from several previous barred owl removal studies, and is designed to ensure a quick kill, minimize the potential for non-fatal injury to barred owls, and vastly reduce the potential for injury or death of non-target species. For use in areas where firearm use would be inadvisable due to safety concerns, local regulations, or the density of human habitation, the protocol includes an option to capture and euthanize barred owls. Basic documentation and information would be required for all removals to ensure application of the protocol and to provide information for potential future modifications to this protocol.

All removal conducted under any of the action alternatives would utilize the methods that conform to the removal protocol found in Appendix 2, or potential future revisions to this protocol approved by the Service. All removal specialists would still be required to meet the qualifications and training described in the removal protocol, abide by all components of the protocol for removal, and provide all required annual reports and information required to document implementation. Removal would be conducted by implementing entities, including Federal and non-federal entities or their designees covered under the MBTA permit described above.

Under any action alternative, we would continue to review new information and modify the protocol as needed to ensure removal would be effective at reducing the number of territorial barred owls, be as quick and humane as possible, and pose little to no risk of removal or injury to non-target species. Implementing entities would need to meet the requirements of training for removal specialists described in Appendix 2, abide by the protocol for removal, and provide all required reports.

2.3.1.1. Barred and Spotted Owl Hybrids

All action alternatives would include the potential removal of spotted/barred owl hybrids. The goal of barred owl removal is to open habitat for use by spotted owls. The presence of hybrids represents the same impact to spotted owls as the presence of barred owls, by displacing spotted owls from their territories and preventing their use of habitat. However, the potential effect of hybrid presence on the results of barred owl management will vary depending on the situation. While removal of hybrids is allowed, it is not required.

Hybrids are generally very rare, and if a single hybrid is present on a large barred owl management area, such as an FMA, this may have limited effect on the success of the barred owl removal in improving spotted owl population trends. For spotted owl site management, where the goal is to clear barred owls from a spotted owl site and a buffer around that site, the presence of even one hybrid would severely impact the ability to meet the goal.

In the northern Sierra Nevada, a small but rapidly expanding population of barred and spotted/barred hybrid owls was established by 2017. Experimental removal in this area resulted

in the removal of 13 hybrids, representing 17 percent of the owls removed (Hofstadter et al. 2022, p. 281). In situations where hybrids are a substantial proportion of the population, failure to remove these individuals would greatly reduce the potential response by spotted owls.

2.3.2 Monitoring

All action alternatives include required monitoring of both barred and spotted owl responses to barred owl management, as a requirement for the issuance of the Special Purpose permit. Appendix 4 contains the Implementation and Effectiveness Monitoring Plan. For both types of monitoring, the Service, as the permit-holder, would be responsible for assembling data contributed by designated implementing entities.

Implementation monitoring would be focused on documenting that actions are consistent with those described in the Record of Decision. Implementation monitoring requirements include information on the qualifications of the removal specialists, the location of barred owl management activities, and the barred or hybrid owls removed on an annual basis (see Appendix 4 for additional details).

Effectiveness monitoring would be focused on assessing the success of the barred owl management effort and providing information on the effectiveness of management under different conditions across the range of the northern and California spotted owls. This information could be used for potential future modifications of the approaches and would help us to determine when barred owl management was no longer required.

Monitoring would address effects of barred owl management to both barred and spotted owls. Monitoring requirements would be focused on answering specific questions.

For spotted owls, these questions include:

- Has implementation met the goal of slowing or stopping population declines (or increasing the annual population growth rate) of northern spotted owls relative to population status in the same area prior to barred owl management, or in comparable areas without barred owl management?
- What is the status and trend in abundance, site occupancy/site use, or local (site or territory) colonization/extinction rates of spotted owls in managed areas relative to conditions prior to barred owl management or in comparable areas without management?

For barred owls, the questions include:

- Has implementation reduced the abundance of, or site use by, barred owls, thereby providing areas for northern spotted owls with reduced competition from barred owls?
- Has implementation limited the colonization and establishment of barred owls into the range of California spotted owls?
- What is the status and trend in abundance, site occupancy/site use, or colonization rates of barred owls in managed areas?

The monitoring plan recommends integration with monitoring of northern spotted owl populations and old forests on Federal lands under the Northwest Forest Plan Effectiveness Monitoring Program where feasible. This approach could reduce costs and effort required for monitoring. However, integration with Federal monitoring would not be feasible in all areas where barred owls may be managed. Additionally, some potentially willing landowners or managers may not wish to integrate monitoring on their lands with the shared Federal system. Therefore, the Service will accept monitoring data obtained by other means or by similar means not integrated with the Northwest Forest Plan Effectiveness Monitoring Program, as long as it provides the necessary information for evaluation.

The Service will include monitoring for the effect on barred owls at multiple scales, such as the individual northern spotted owl site (territory), management block (e.g., FMA), physiographic province or area, and range-wide (northern and California spotted owls). Individual site and management block monitoring would be part of the barred owl management action. The Service will summarize information in annual reports. Periodic assessments of monitoring data for barred owls and spotted owls will occur annually to update selected population indicators for barred and spotted owls, and at five-year intervals. The five-year assessment would be conducted coincident with meta-analyses of northern spotted owl population trends under the Northwest Forest Plan Effectiveness Monitoring Program, allowing for formal analyses of the effectiveness in meeting the goals as barred owl management is implemented. Detecting changes in spotted owl population trend requires multiple years of data, and a five-year interval has proven effective in analyzing northern spotted owl demographic performance on the demography study areas (Franklin et al. 2021, entire) (See Appendix 4 for additional details).

2.3.3 Prioritization

To further focus barred owl management efforts, we developed a set of priority ratings for management areas or components for actions in each province. The priorities are primarily for the benefit of entities that are planning to fund or carry out barred owl management and are selecting among multiple options within a given province.

The priorities are non-binding and any action described as part of the alternative selected in the Record of Decision may be implemented at any time. We do not need to implement all Priority A items before starting on Priority B items. In some cases, a landowner that wants to participate in barred owl management may only have Priority D or E options on their lands. They may implement such actions, even though the options available to them are not the highest priority.

There are a different set of priorities for northern and California spotted owls based on the differences in the conditions within their respective ranges. The priorities were used to select the GMAs included in Alternatives 4 and 5.

Northern spotted owl range

Barred owl management actions and areas would be prioritized within each physiographic province or area to provide focus and recommendations to implementing entities, though the prioritization would be non-binding. Management actions consistent with the Record of Decision

would be allowed at any time in any province or area as described. Within the northern spotted owl range, the proposed Strategy includes a five-level prioritization system (A to E, in which A is the highest priority), applied at the province level.

- **Priority A** defines actions that should and can be implemented immediately to prevent extinction or extirpation of northern spotted owls in the province or targeted areas in the province, particularly in areas with very low northern spotted owl populations. Additionally, in areas where northern spotted owl populations are not critically low, this defines actions needed to secure key areas with remaining populations as anchors to the eventual expansion.
- **Priority B** defines actions that should be implemented as soon as possible to slow northern spotted owl population declines.
- **Priority C** defines actions that should be implemented in the near future to establish areas for northern spotted owl populations to stabilize and increase to sustainable levels.
- **Priority D** defines action that, if implemented, would further assist in stabilizing or increasing northern spotted owl populations.
- **Priority E** defines actions that, if implemented, would provide additional support to spotted owl populations.

These priorities apply to barred owl management at the scale of both individual spotted owl sites, and block management or other management within mapped management areas. When referring to site management, the priorities apply regardless of whether the site is located within or outside a mapped barred owl management area. When applied to mapped management areas, the given priorities are based on the current available information. New information may become available over time that would support a different prioritization for a given mapped management area. Therefore, we encourage future implementers using these priorities in decision making to consider the rationale for the prioritization (see Appendix 4), as well as the full definitions of the priorities (see Appendix 3), to determine whether a change in priority for a mapped management area may be warranted.

Additionally, we encourage implementers to carefully consider the risks and benefits associated with spreading barred owl management among multiple mapped management areas within a province (some of which may be lower priority), which would be beneficial for redundancy, versus implementing management over a larger portion of a single, high priority mapped management area, which may allow for more efficient barred owl removal and exclusion and higher northern spotted owl population connectivity. These factors may sometimes justify the selection of lower-priority options even when higher-priority options are available.

California spotted owl range

Barred owl management actions and areas would be prioritized within the California spotted owl range, within each proposed DPS. We developed a three-level prioritization system (A to C, with A being the highest priority), applied at the population level. See Appendix 5 for more details.

- **Priority A:** Actions that should be implemented as soon as possible to prevent barred owls from establishing populations where they are not yet established, particularly in areas where the risk of population establishment is high.
- **Priority B:** Actions that should be implemented in the near future to prevent barred owl populations from expanding and establishing populations where they do not currently exist.
- **Priority C:** Actions that may be implemented over time and would help to prevent barred owl populations from expanding and establishing populations.

2.3.4 Barred Owl Management Areas

In the range of the northern spotted owl, most of the action alternatives would include barred owl management focused on mapped General Management Areas (GMAs) and associated smaller Focal Management Areas (FMAs) within the boundaries of the GMAs. GMAs represent geographic areas where control efforts would be focused. Within GMAs, FMAs would be smaller areas established by implementing agencies or entities, where control efforts would be intended to reduce barred owl populations sufficiently to allow increased survival and recruitment of spotted owls. Based on experience from the Removal Experiment, these FMAs would be small enough that they could be reasonably managed for barred owl removal, yet large enough that they should be able to provide for source populations of spotted owls. Spotted owl site-based management, as well as several other types of management areas, would be associated only with Alternative 2 and these are described in Section 2.4.

General Management Areas

GMAs are large, areas within the boundaries of which barred owl management would occur under each alternative in the manner described in that alternative and are the primary focus of barred owl management for many of the action alternatives described below.

These GMAs were developed, mapped, and prioritized with the assistance of the interagency, intergovernmental team at the physiographic province scale for northern spotted owl, in keeping with the Recovery Plan's focus on maintaining viable northern spotted owl subpopulations within each province (USFWS 2023a, Section 10; USFWS 2011, p. II-1). For all action alternatives, we included the forested edges of the Willamette Valley Physiographic Province with the adjacent forested provinces (Oregon Coast Ranges or Western Oregon Cascades Physiographic Provinces). Most GMAs include enough area to potentially support 200 to 300 northern spotted owl sites, though some are smaller or larger due to topographic or habitat conditions, or specific goals. Because the home range size of spotted owls varies by province, the size of GMAs meeting 200 to 300 pair size ranges from a low of approximately 175,000 acres in the California Coast Province redwood zone to a high of 1,700,000 acres in the Washington provinces.

The larger GMAs allow for the creation of multiple smaller FMAs within each GMA. Multiple smaller barred owl management areas within such a landscape would provide some redundancy

to protect against loss of those managed areas to catastrophic events, such as large, high-severity wildfires. The GMAs represent the boundaries within which these smaller, focused barred owl management areas would be created at the time of implementation of any action alternatives containing GMAs. We did not include Tribal lands within GMAs unless requested to do so by the Tribe. The Yurok and Hoopa Valley Tribes requested inclusion of their lands in northern California, and the Yakama Nation requested inclusion of a portion of their lands in the Eastern Washington Cascades within GMAs, thereby allowing for barred owl management on these areas under the proposed Strategy. Where possible around the edges of the GMAs, we did not include towns and other populated areas. While some towns and populated areas do remain in the boundaries, these areas would not be part of any barred owl management area, and no firearms use in removal activity would occur within ¼ mile around towns, occupied dwellings, established open campgrounds, and other locations with regular human use. (Appendix 2). Barred owls would only be removed from the lands of willing landowners or land managers.

Considerations used in mapping the proposed GMAs included, but were not limited to, known locations and densities of northern spotted owl sites, northern spotted owl habitat quality, density, and diversity, estimated barred owl density, location of current and ongoing research efforts, connectivity across province boundaries, potential risk of catastrophic losses to wildfire and other stochastic events, potential or current isolation of northern spotted owl populations, and the presence of potential barriers to barred owl invasion. We used landscape-scale GIS layers including, but not limited to, ownership, management status, northern spotted owl habitat, forest lands, fire risk maps, and spotted owl site history. In this context, forest lands include any lands with the capability to grow forests or which were historically forested, including recently harvested or burned landscapes, and all ages of forest. We use forest lands to provide reasonable representation of potential barred owl habitat.

We do not anticipate that the entire area within any GMA would be under barred owl management at any one time under most alternatives given the large areas involved, potential cost of barred owl management, limitations of access and topography in portions of each area, and the desire to spread the effort across a wider area to reduce risk of the loss of areas to large stochastic events such as wildfires. In each alternative, the total area that could be under barred owl management at one time is defined for each GMA, in terms of a percentage of the area. The actual specific areas under barred owl management within a GMA could change over time, but the total amount of management would not exceed the levels described and analyzed under each alternative.

Focal Management Areas

The GMAs represent the outer boundaries of areas within which smaller FMAs would be established during removal implementation, by the implementing agency/entity or a group of agencies/entities, based on general direction and prioritization provided in the selected alternative. This would provide the implementing entities with the opportunity to set the FMA boundaries where active removals would occur based on the latest local knowledge, interests, and agency management goals. Focal Management Areas could occur anywhere within the GMA boundaries, with a total area not to exceed that described in the relevant alternative.

In most GMAs, we recommend FMAs be of a size that could support 50 northern spotted owl pairs. Past analyses and modeling have identified areas capable of supporting 20 spotted owl pairs as having a reasonable likelihood of spotted owl population stability and persistence over 50 to 100 years, even with low to moderate movement of individuals between these areas (Thomas et al. 1990, p. 24). However, we do not anticipate that barred owl removal could remove all barred owls within an FMA, and barred owls would continue to invade the area each year. Therefore, we recommend a larger size, capable of supporting 50 northern spotted owl pairs, allowing for some limitation on spotted owl habitat use within the area based on competition from remaining or invading barred owls. Our experience with the Barred Owl Removal Experiment showed that we were able to arrest the decline of spotted owls within treatment areas large enough to support approximately 50 pairs.

Habitat and topographic conditions could limit the size of FMAs in some GMAs. In this case, smaller FMAs could be required in such areas, though we recommend that these be as large as possible, with a focus on areas capable of supporting a cluster of multiple sites, rather than single sites. We recommend that smaller FMAs be placed in closer proximity to allow for spotted owl population interaction. In all cases, the total area of FMAs would be limited to the level described for each GMA in the alternative.

2.4 Alternative 2 – Preferred Alternative

This alternative is implementation of the proposed Barred Owl Management Strategy, developed by the Service with the assistance of an interagency, intergovernmental team. Identified as the proposed action in the Draft EIS, the Service now identifies this as the Service's preferred alternative. Under this alternative, implementing entities would employ lethal removal methodology and monitoring of all barred owl management actions as described in Section 2.3 and below. Implementing entities would still have to meet the requirements of training for removal specialists, abide by the protocol for removal, and provide all required monitoring reports. The primary difference between this preferred alternative and the other action alternatives is the total area included in potential barred owl management and the location of management areas.

2.4.1 Northern spotted owl

Under this alternative, there would be three approaches to barred owl management, applied across the range at varying scales – 1) northern spotted owl site management, 2) General Management Areas with their associated FMAs, and 3) Special Designated Areas. The details of management under these approaches would vary by province, depending on the condition of northern spotted owls, barred owls, and habitat within the province, as described further in the proposed Strategy.

Northern Spotted Owl Site Management

Spotted owl site management would be an early and high priority focus of barred owl management in all provinces. Site management would be focused on removing barred owls from

within and around sites where northern spotted owls are present to provide for the maintenance of these remaining northern spotted owls while larger block management efforts are developed and implemented. Site management could occur anywhere within a province. These northern spotted owls could provide a source of owls for recolonization of larger blocks as barred owl populations decreased and could be the nucleus of northern spotted owl populations in future management blocks.

In all provinces, this alternative would include management of barred owls in the vicinity of prioritized northern spotted owl sites, including all recently occupied sites, which for the purposes of barred owl management, we define as sites with northern spotted owl detection or occupancy in the past five years. Depending on the condition of northern spotted owl populations in a province, recommendations for site management could include sites with older information, historical sites not recently surveyed, or areas with habitat conditions capable of supporting a northern spotted owl site.

To define the area under management within and around northern spotted owl sites, we used the home range radius. These are province-specific values derived in past studies from the area used by radio-tagged northern spotted owls over the course of a year. The radius defines a circle that includes the average acreage used by the radio-tagged birds (Table 2-1). Northern spotted owl site management would involve the lethal removal of barred owls within an area of at least 1.5 times the northern spotted owl estimated home range radii of the site center. This could be extended to three home range radii if the implementing entity chose to do so. The additional area beyond the estimated home range radius is designed to buffer the spotted owl sites from close proximity of barred owls.

Some northern spotted owl sites would lie within or overlap the boundaries of GMAs, and in areas with denser remaining northern spotted owl populations, buffered sites would overlap significantly.

Table 2-1: Alternative 2 – Preferred Alternative – Strategy Implementation. Standardized home range radii (HRR) for northern spotted owl sites in the range of the northern spotted owl for barred owl management.

Physiographic Province	HRR in Miles	1.5 HRR in Miles	Area within 1.5 HRR in Acres
Olympic Peninsula	1.8[1]	2.7	14,657
Western Washington Lowlands	1.8[1]	2.7	14,657
Western Washington Cascades	1.8	2.7	14,657
Eastern Washington Cascades	1.8	2.7	14,657
Oregon Coast Ranges	1.5	2.3	10,179
Western Oregon Cascades	1.2	1.8	6,514
Eastern Oregon Cascades	1.2	1.8	6,514
Oregon Klamath	1.3	2.0	7,645
California Klamath	1.3	2.0	7,645
California Cascades	1.3	2.0	7,645

Physiographic Province	HRR in Miles	1.5 HRR in Miles	Area within 1.5 HRR in Acres
California Coast – mixed-conifer zone	1.3	2.0	7,645
California Coast – redwood zone	0.7	1.1	2,217

[1]In consultation the home range radii used for the Olympic Peninsula and Western Washington Lowlands is 2.7 miles, based on radiotelemetry studies conducted in the western portion of the Olympic Peninsula This is also used in the Washington Forest Practices rules. For the purpose of barred owl management, this resulted in an extremely large area. The biologists decided that 1.8 miles was adequate for barred owl management in this situation. This does not change other uses of the 2.7-mile radius.

General Management Areas:

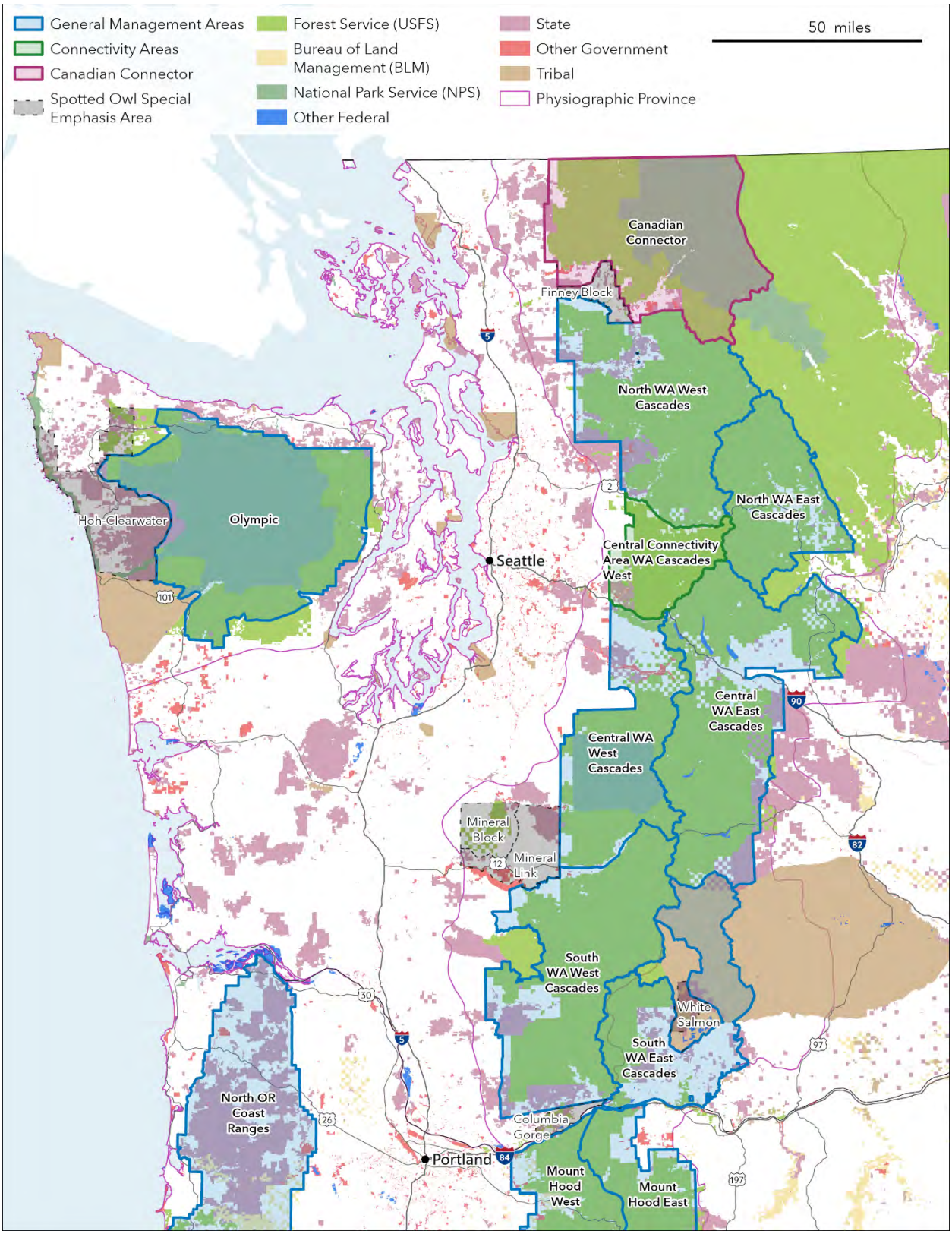
General Management Areas would be the primary focus of barred owl management in this alternative. The GMA approach is common to most action alternatives and is described in Section 2.3.4. For this alternative, GMAs were mapped and prioritized in all provinces (Maps 2-2, 2-3, 2-4, Table 2-2). Within GMAs, FMAs would be established during implementation of the proposed Strategy, by the implementing agency/entity or a group of agencies/entities, based on local knowledge of the implementing entity. FMAs may be identified by landowners, land managers, administrators, or other entities. However, implementation of barred owl management on lands within any FMA would require the permission of the landowner or land manager. These FMAs would be the location of active barred owl removal. Where habitat and topographic conditions limit the size of potential FMAs, smaller FMAs could be developed. For example, we anticipate that conditions within some GMAs in the Eastern Oregon Cascades and California Klamath provinces would limit application to these smaller FMAs. Similar conditions may exist in portions of other GMAs.

To encourage distribution of implementation across the provinces within the range of the northern spotted owl and to set reasonable expectations on the level of barred owl management likely to be feasible at a province scale, the total area of barred owl removal within GMAs would be limited under this alternative. The entire area within any GMA would generally not be under barred owl management at any one time. Within each province, we encourage, but do not require, implementers to consider limiting barred owl management within a single GMA to 50 percent and provide redundancy against catastrophic loss (e.g., loss of the northern spotted owl habitat by wildfire, which would impact the effectiveness of any barred owl control conducted in that area) by implementing barred owl management in multiple GMAs within the province where practicable.

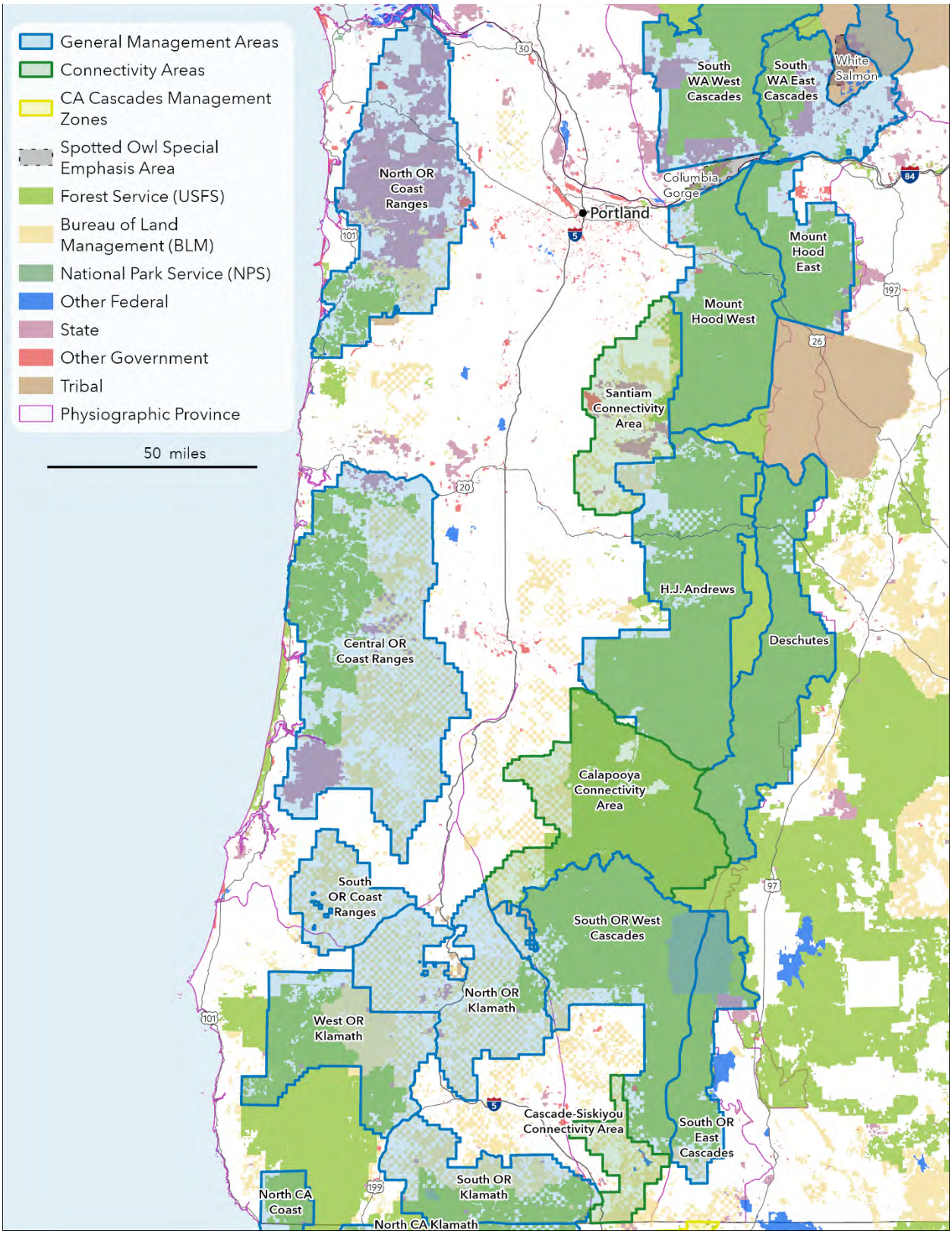
In keeping with the focus of Recovery Plan Criterion 2 on developing viable spotted owl subpopulations within each province, we set a maximum of 50 percent of the combined GMA area within a province for barred owl management at any one time. This can be distributed between the GMAs based on the interest of landowners and land managers. This maximum applies only to barred owl management within FMAs. Spotted owl site management outside of FMAs, but within a GMA, or outside of GMAs, does not count towards the 50 percent maximum area under barred owl management.
Based on information from public comments and new data, we modified the boundaries of several GMAs and Special Designated Areas in the northern spotted owl range. Substantial area was added to the South Washington East Cascades, Mount Hood West, South Oregon East

Cascades, and Central California Coast GMAs. The South California Coast GMA was modified to remove the overlap with the Marin/Sonoma Management Zone. Minor boundary adjustments occurred in the Olympic, Central Washington East Cascades, and South Oregon West Cascades GMAs and the Central Connectivity Area in the Western Washington Cascades. All GMAs in the California Cascades province were converted to Special Designated Areas. The Southern Buffer Zone was removed and replaced with general barred owl management within the province as a potential pathway for barred owl invasion of the California spotted owl range. In the California spotted owl range, we revised the maps of the potential invasion pathways and clarified the priority for monitoring in various portions of the range and the potential invasion pathways.

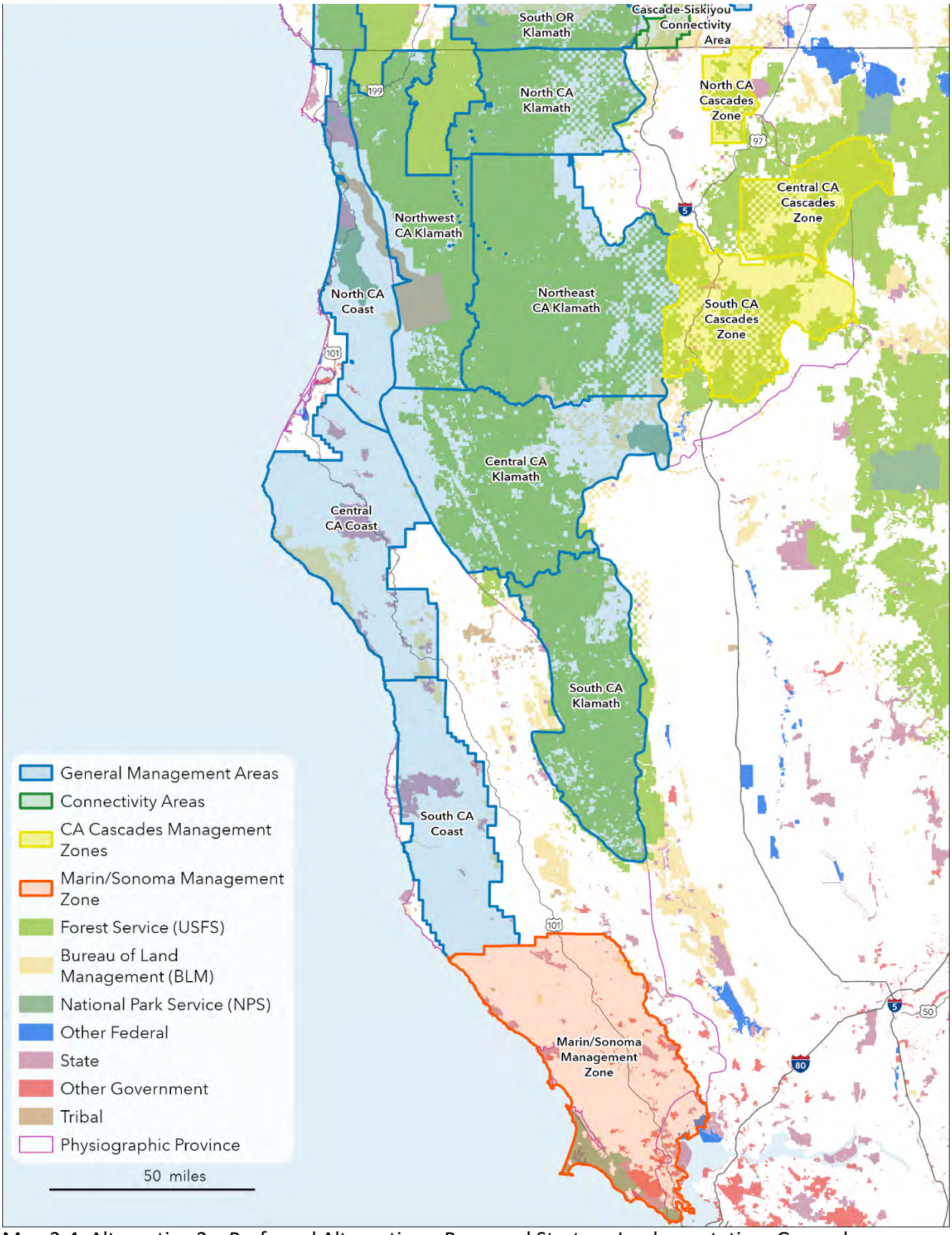
Focal Management Areas could occur anywhere within the GMA boundaries, as long as the total area under barred owl management at any one time did not exceed the levels described above. The specific location of barred owl management within the GMA could also change over time in response to new information or changes resulting from catastrophic events such as wildfire.



Map 2-2: Alternative 2 – Preferred Alternative – Proposed Strategy Implementation: General Management Areas and Special Designated Areas in the northern spotted owl range in Washington.



Map 2-3: Alternative 2 – Preferred Alternative – Proposed Strategy Implementation: General Management Areas and Special Designated Areas in the northern spotted owl range in Oregon.



Map 2-4. Alternative 2 – Preferred Alternative – Proposed Strategy Implementation: General Management Areas and Special Designated Areas in the northern spotted owl range in northern California.

Table 2-2. Maximum forest acres under barred owl management within GMAs at any one time in each province under Alternative 2 – Preferred Alternative.

Physiographic Province	Maximum Forest Acres Under Barred Owl Management
Olympic Peninsula	639,016
Western WA Cascades	1,791,253
Eastern WA Cascades	1,130,651
OR Coast Ranges	1,568,510
Western OR Cascades	1,908,047
Eastern OR Cascades	768,641
OR Klamath	965,905
CA Coast	1,148,702
TOTAL	11,717,544

Special Designated Areas

We mapped five types of Special Designated Areas to meet specific needs or situations (Table 2-3). Management direction would vary by designation and priority within the province. The described activity would be in addition to, and not a replacement for, site management as described above.

1. *Connectivity Areas:* We mapped these areas in Washington and Oregon. They generally lie between larger GMAs and are intended to provide for some connection and movement between GMAs once northern spotted owl populations stabilize in the GMAs. While these would be generally of lower priority and would meet their full value as northern spotted owl populations developed in the neighboring GMAs, barred owl management to maintain existing northern spotted owl sites would provide a base for expanding management in the future. Therefore, under this alternative, barred owl management could occur on up to 25 percent of the forest lands in the collective connectivity areas in each province where they occur (Map 2-2 and 2-3).

2. *Canadian Connector:* The Government of British Columbia, Canada, is engaged in a barred owl management and northern spotted owl reintroduction effort. If those efforts are successful, barred owl management in this block on the U.S. side of the border with Canada could be valuable to that effort. While we do not know what that would entail at this time, we anticipate some barred owl management activity in this area may be of conservation value in the future. Under this alternative, in addition to spotted owl site management, barred owl block management would occur on up to 25 percent of the forest lands in this designation at any one time (Map 2-2). This lower level is based on the low priority for this area.

3. *Spotted Owl Special Emphasis Areas:* The State of Washington identified key landscapes, referred to as Spotted Owl Special Emphasis Areas (SOSEAs), where northern spotted owl conservation in the form of demographic and/or dispersal support was important on non-federal lands. Where SOSEAs lie within GMAs, connectivity areas, or the Canadian Connector, barred owl management as described for those designations would apply. However, barred owl management on portions of the SOSEAs that lie outside of these areas could provide support to northern spotted owl populations in the provinces. While these areas would generally be of lower priority, barred owl management could occur on 10 percent of

forest lands within the collective SOSEAs outside of other designations in each Washington Physiographic Province (Map 2-2).

4. *Marin/Sonoma Management Zone*: Conditions in Marin and Sonoma Counties are substantially different than in the rest of the northern spotted owl range. Barred owls are present in small numbers and have not yet established significant populations. The remaining northern spotted owl habitat is found in blocks of limited size managed by various agencies and landowners. Under this alternative, barred owl management focus in this area would be on preventing barred owls from becoming established and displacing the remaining northern spotted owls. Therefore, in these counties, barred owls could be removed from the land of willing landowners and land managers anywhere within these counties (Map 2-4).

5. *California Cascades Management Zones:* The California Cascades province, while within the northern spotted owl range, is one of the primary pathways for barred owl invasion of the California spotted owl range. As such, location and removal of all barred owls within this province is a high priority. If this approach is successful, no additional barred owl management would be needed in the province. However, if this approach cannot be fully applied, we have mapped three potential management zones where development of barred owl block management areas may be beneficial for the northern spotted owl population.

Table 2-3. Maximum forest acres under barred owl management within Special Designated Areas at any one time in each province under Alternative 2 – Preferred Alternative. Management could occur on 10 percent of SOSEAs and 25 percent of other Special Designated Areas.

Physiographic Province	Designation Type	Percent of Area Under Barred Owl Management	Maximum Forest Acres Under Barred Owl Management
Olympic Peninsula	SOSEA Special Designated Area	10	35,941
Western Washington Cascades	Connectivity Area	25	66,439
	Canadian Connector	25	186,296
	SOSEA Special Designated Area	10	35,134
Eastern Washington Cascades	SOSEA Special Designated Area	10	4,491
Western Oregon Cascades	Connectivity Area	25	422,554
CA Coast	Marin/Sonoma Management Zone	100	587,434
CA Cascades	Management Zones	100	1,976,883
TOTAL			3,315,172

Initial barred owl management in the Marin/Sonoma Management Zone and the California Cascades Management Zones would be based on survey, inventory, and monitoring, followed by removal of all barred owls detected. Therefore, barred owl management could occur across the entire area on lands of willing landowners should barred owls be found.

2.4.2 California spotted owl

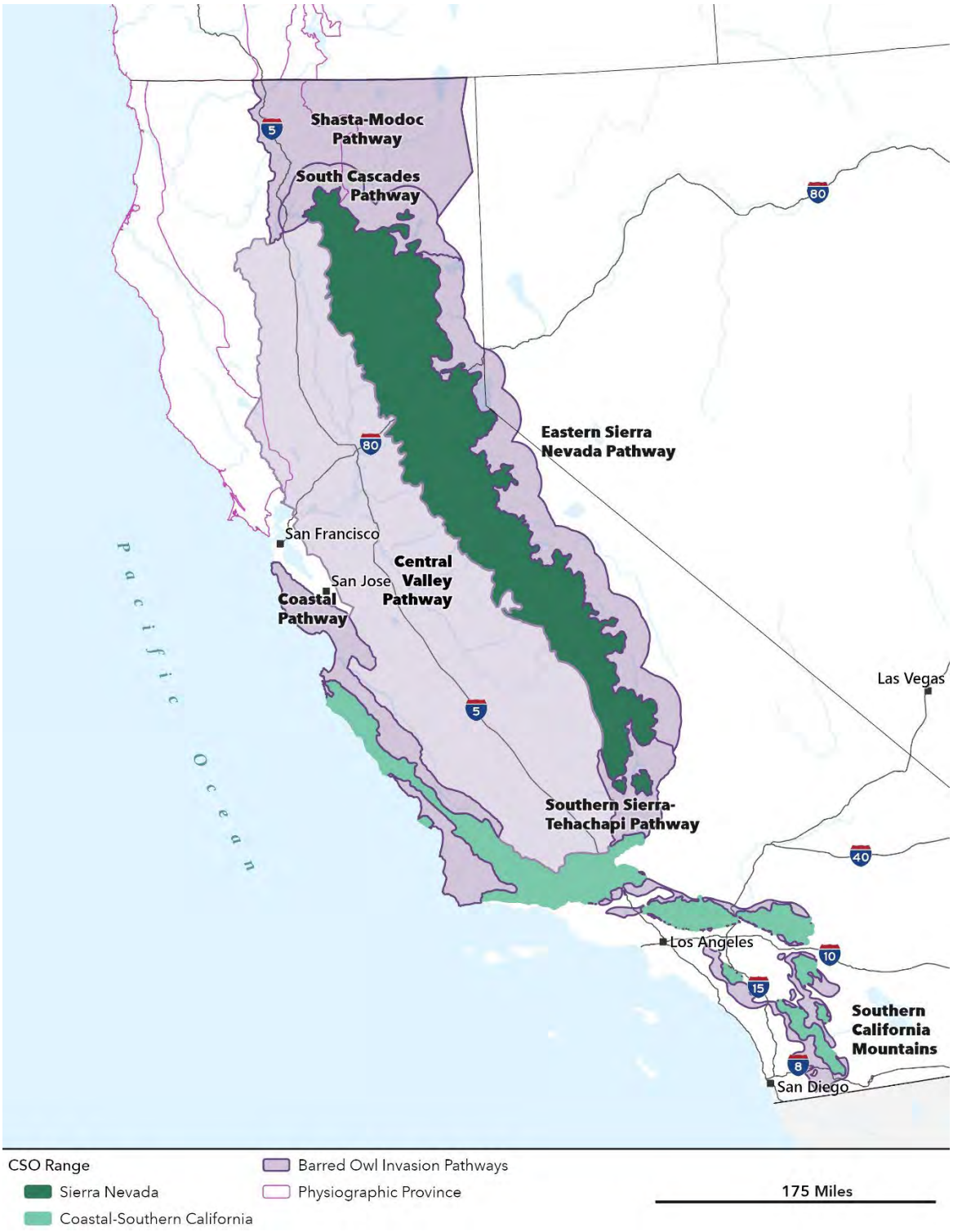
Barred owl populations are not yet fully established in the range of the California spotted owl. Therefore, barred owl management would be focused on preventing their future establishment. There would be two primary elements: (1) survey, inventory, and monitoring for invading barred owls and (2) removal of any and all barred owls that were located.

Under this alternative, we would take advantage of the current established monitoring networks for the detection of barred and California spotted owls, coupled with additional information from broad-scale systematic sampling, focal monitoring at sentinel California spotted owl research sites, barred owl detections recorded during short-term project-level surveys, and anecdotal observations. Additional operational monitoring would be recommended, focused on locating invading barred owls. This would include establishing a focused and extensive inventory and monitoring network within potential barred owl invasion pathways into the Sierra Nevada from the northern spotted owl range in the northern Sierra Nevada area. We identified two primary invasion pathways in this area, the South Cascades and Shasta-Modoc. We recommend extensive monitoring of these areas, with particular focus on the South Cascades pathway.

While these are the primary invasion pathways, barred owls may enter the area from the east or west through secondary pathways. We established the Eastern Sierra Nevada invasion pathway along the east side of the California spotted owl range to detect invasion from the east, and the Central Valley invasion pathway to detect barred owls that may approach from the west. (Map 2-5). In these areas, barred owl management would focus on using existing sources of information, focusing on locations where barred owls are detected at least twice.

California spotted owls in the Coastal-Southern California area are at higher risk due to small populations and fragmented habitat. While barred owls have not yet invaded these areas, ensuring that they would not become established in this area would be the primary focus of this alternative. This alternative would include focused inventory and monitoring within the Coastal-Southern California spotted owl range, in the primary potential invasion pathways from the southern Sierra Nevada (Southern Sierra-Techachapi pathway) and along the central coast from the northern spotted owl range (Coastal pathway). Barred owls may also invade through the secondary Central Valley pathway. Barred owls that evade detection while traveling through one of these invasion pathways could also be present in the Southern California Mountains Invasion Pathway immediately adjacent to the Coastal-Southern California spotted owl range.

If territorial barred owls were located on any of the monitoring, inventory, surveys, or incidental reports, within the range of the California spotted owl, or within the potential invasion pathways described above, this alternative prioritizes efforts to remove these barred owls as quickly as practicable, from the lands of willing landowners or land managers.



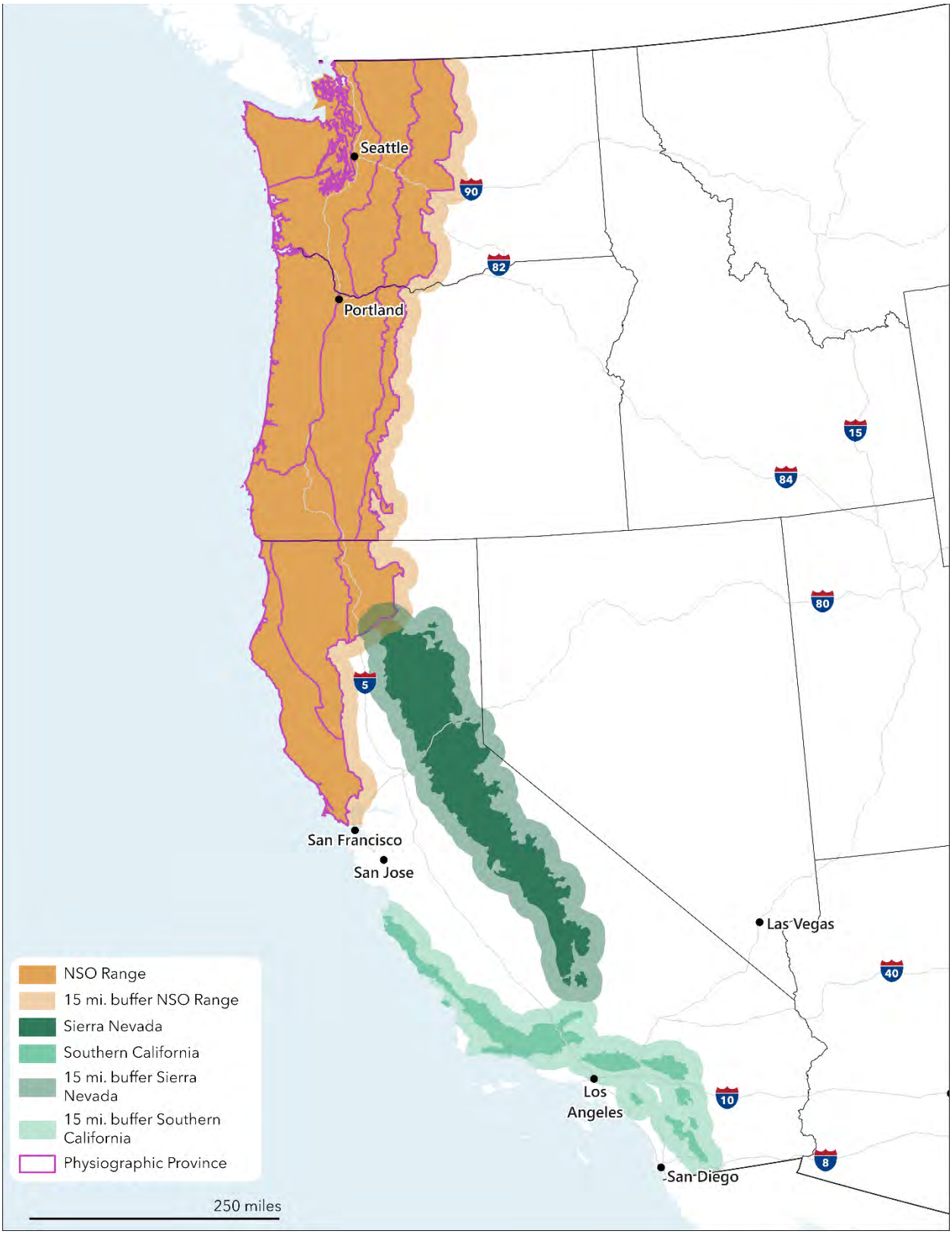
Map 2-5. Alternative 2 - California spotted owl range, including Sierra Nevada and Coastal-Southern California segments and primary invasion pathways.

2.5 Alternative 3 – Management Across the Range

Under this alternative, barred owl management could be implemented anywhere within the range of the northern or California spotted owls or within 15 miles of the range of the subspecies (Map 2-6). The 15-mile buffer would allow for barred owl management in nearby areas where barred owl populations may be producing young birds that would otherwise disperse into the spotted owl ranges to potentially reduce the number of dispersers.

In the northern spotted owl range, barred owl management could occur on areas of any size, with the total area under management capped at a maximum of 50 percent of the forest area within the subspecies' range at any point in time. This level of management would allow for substantial areas under barred owl management but reflects the limitations of access and topography in each area, as well as the logistics and expense of operating over such a large area. The location of individual barred owl management areas would be determined at the time of implementation, and could change over time, as long as the total did not exceed 50 percent of the total forest area, or 25,721,475 acres, included in active management at any one time.

In the California spotted owl range, no additional monitoring would be implemented. Location of barred owls for removal would be limited to information from existing monitoring, research, survey, and other records. Management would be focused on the lethal removal of all barred owls detected from the land of willing landowners, as soon as practicable following detection. Barred owl removal could occur across 50 percent of the forested within the California spotted owl range and 15-mile buffer, or 11,269,234 acres.



Map 2-6: Alternative 3. Northern and California spotted owl ranges, with 15-mile buffer.

2.6 Alternative 4 – Limited Management by Province/Population

In the northern spotted owl range, under this alternative, barred owl management could be implemented within a single GMA in each physiographic province (Map 2-7). Barred owl management could occur on up to 100 percent of the forest lands in each GMA, though multiple smaller management areas would also be possible (Table 2-4). This single GMA would potentially provide for a single large population of northern spotted owls in each province.

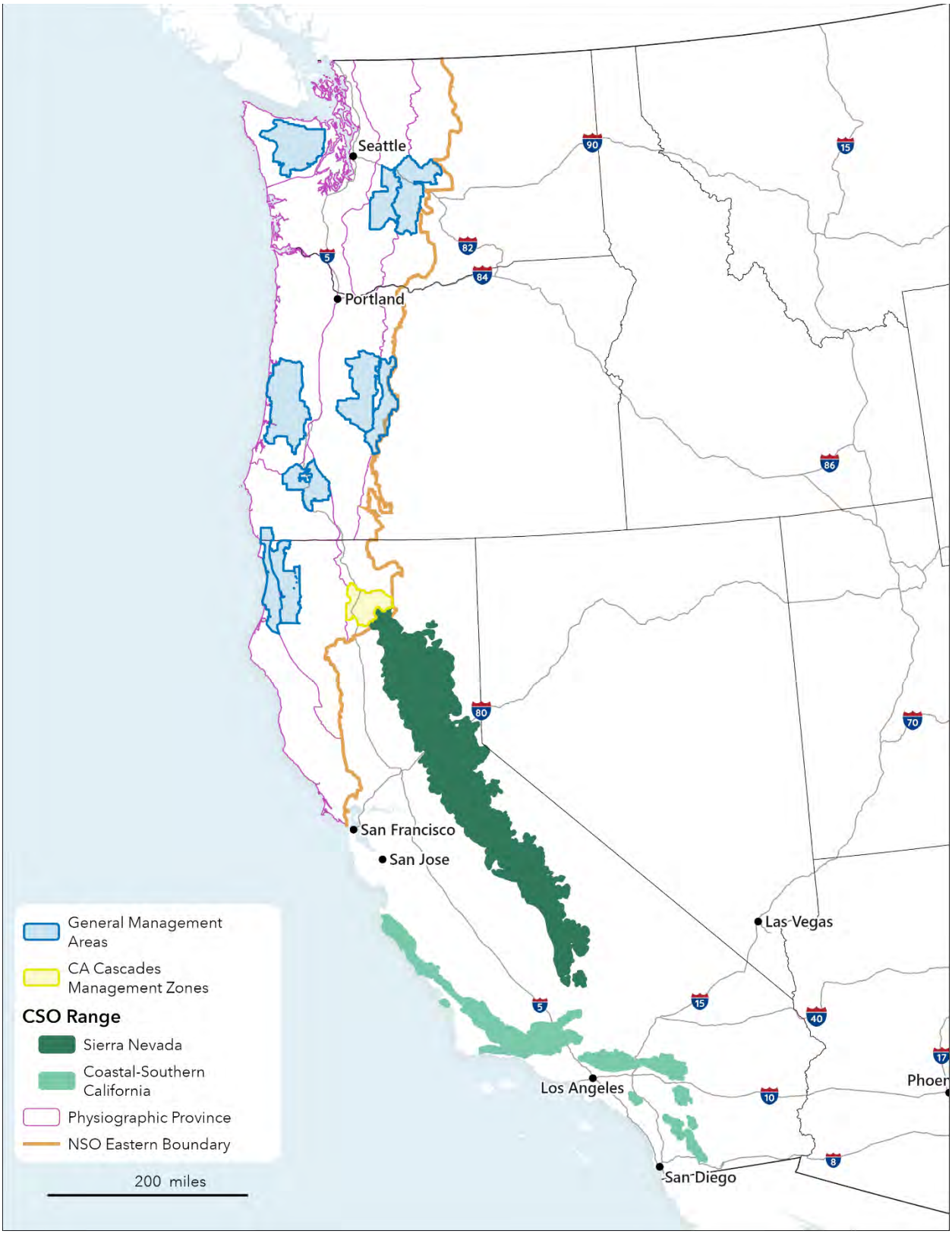
Table 2-4. Estimated maximum forest acres under barred owl management by province under Alternative 4.

Physiographic Province	Maximum Potential Forest Acres Under Barred Owl Management
Olympic Peninsula	1,206,151
Western Washington Cascades	654,931
Eastern Washington Cascades	1,137,645
Oregon Coast Ranges	1,724,821
Western Oregon Cascades	1,273,146
Eastern Oregon Cascades	683,833
Oregon Klamath	755,556
California Coast	679,747
California Klamath	902,936
California Cascades	732,339
Total	9,751,105

In the California spotted owl range, under this alternative, barred owl management would be delayed until barred owl occupancy reached a threshold level. Barred owls would be located using information from existing monitoring, research, and survey efforts, as well as additional focused and extensive inventories in the northern portion of the Sierra Nevada, the most likely barred owl invasion pathway into the Sierra Nevada from the northern spotted owl range.

In the Sierra Nevada portion of the California spotted owl range, barred owl removal would be initiated when monitoring or inventory data indicated that barred owls were being detected on 10 percent or more of an area. Barred owl removal, and monitoring of the removal area, would continue until barred owl detection rates dropped below one percent. Monitoring would continue following cessation of removal and removal would be reinitiated if detection rates rose above 10 percent again.

California spotted owls are proposed for listing as endangered in the Coastal-Southern California portion of their range and as a result, we have set less restrictive conditions for implementing barred owl removal is this area. Therefore, barred owl removal in this area would be initiated when monitoring or inventory data indicated that barred owls were being detected on five percent or more of an area. Barred owl removal, and monitoring of the removal area, would continue until barred owl detection rates dropped below one-half percent. Monitoring



Map 2-7. Alternative 4. Northern and California spotted owl ranges.

would continue following cessation of removal and removal would be reinitiated if detection rates rose above five percent again.

2.7 Alternative 5 – Management Focused on the Highest Risk Areas

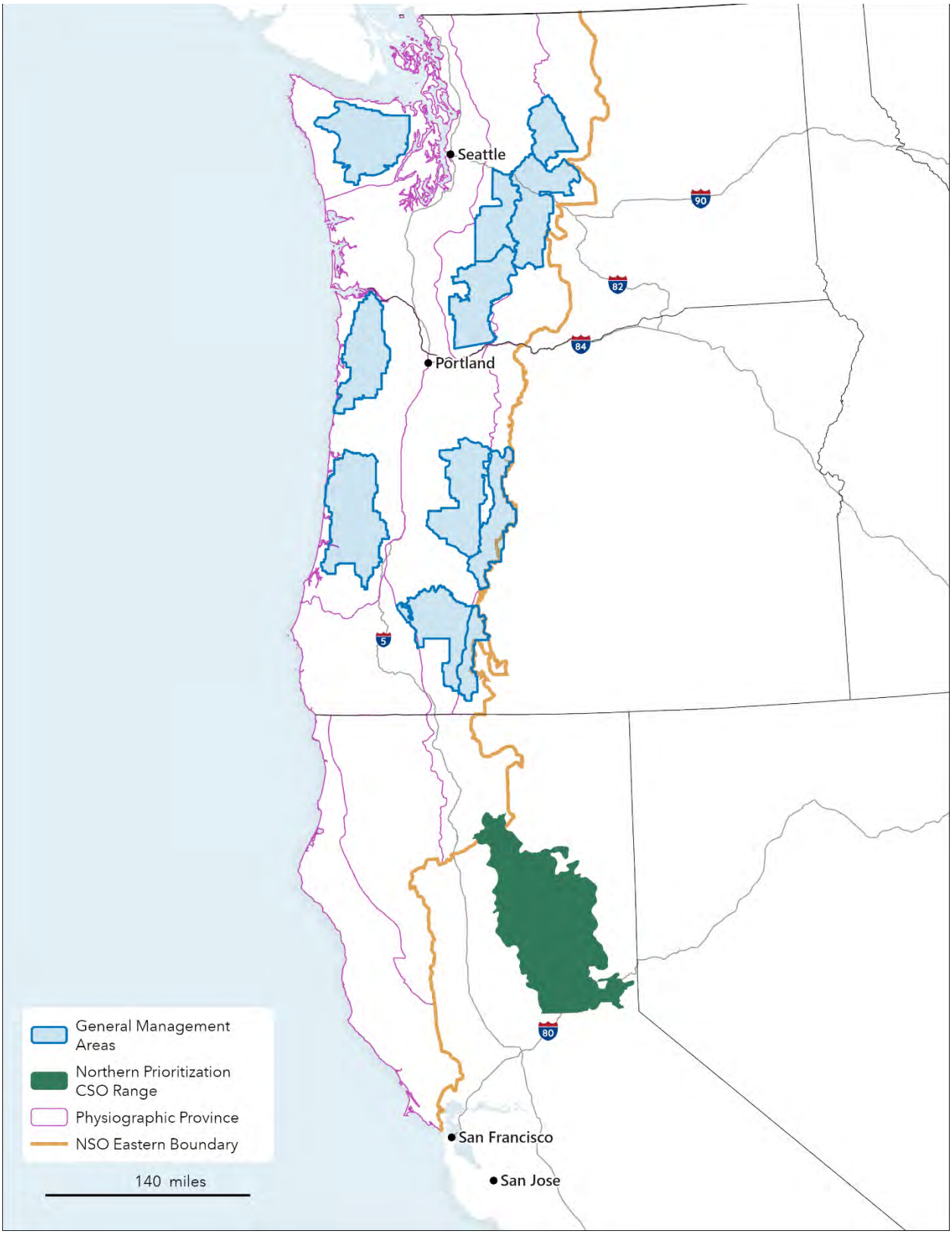
In the northern spotted owl range, under this alternative, barred owl management would be focused on two GMAs in each of the Eastern Washington Cascades, Western Washington Cascades, Eastern Oregon Cascades, Western Oregon Cascades, and Oregon Coast Ranges Physiographic Provinces and one GMA in the Olympic Peninsula Physiographic Province (Map 2-8). These are the provinces in which northern spotted owls are at the highest risk of extirpation in the short term. Within the northern spotted owl range, no barred owl management outside these selected GMAs would be authorized under this alternative. Barred owl management could occur on up to 100 percent of the forest lands in each GMA, though multiple smaller management areas would also be possible (Table 2-5).

Table 2-5. Estimated maximum forest acres under barred owl management by province under Alternative 5.

Physiographic Province	Maximum Potential Forest Acres Under Barred Owl Management
Olympic Peninsula	1,206,151
Western Washington Cascades	1,756,596
Eastern Washington Cascades	1,590,019
Oregon Coast Ranges	2,838,088
Western Oregon Cascades	2,303,741
Eastern Oregon Cascades	1,036,953
Oregon Klamath	0
California Coast	0
California Klamath	0
California Cascades	0
Total	10,731,548

In the California spotted owl range, under this alternative, barred owl management would be limited to the northern portion of the Sierra Nevada portion of the subspecies range (Map 2-8). Barred owls would be located using information from existing monitoring, research, survey, and other records, as well as additional focused and extensive inventories in the northern portion of the Sierra Nevada, the most likely barred owl invasion pathway into the Sierra Nevada from the northern spotted owl range. All barred owls detected would be lethally removed from the land of willing landowners, as soon as practicable following detection.

Under this alternative, implementing entities would employ lethal removal methodology and monitoring of all barred owl management actions. They would still have to meet the training requirements for removal specialists, abide by the protocol for removal, and provide all required monitoring reports.



Map 2-8. Alternative 5. Northern and California spotted owl ranges.

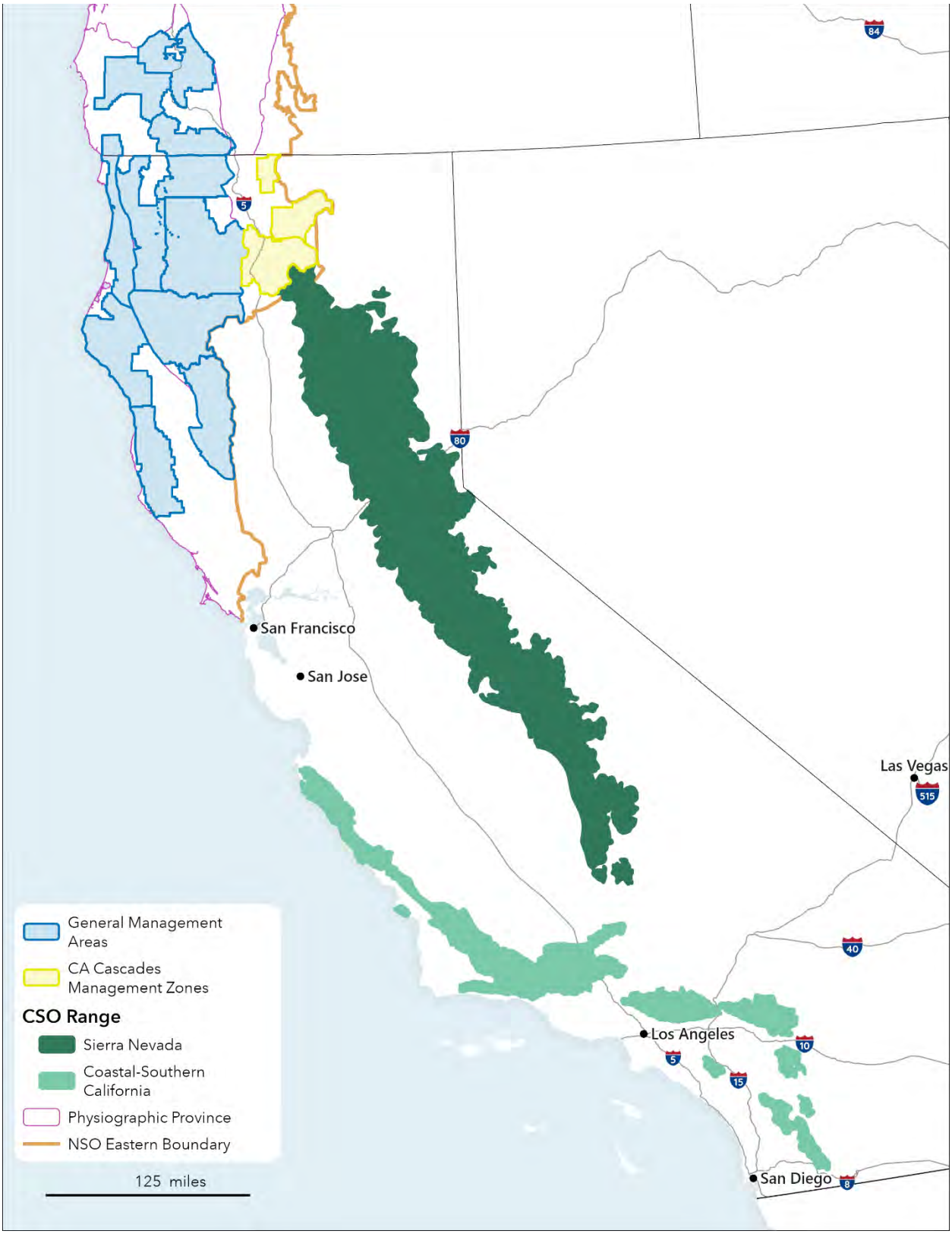
2.8 Alternative 6 – Management Focused on Best Conditions

In the northern spotted owl range, under this alternative, barred owl management would be focused on GMAs in the Oregon Klamath, California Coast, and California Klamath provinces and Special Designated Zones in the California Cascades province. No barred owl management outside these GMAs would be authorized under this alternative (Map 2-9). Barred owl management could occur on up to 75 percent of the forest lands in each GMA in the California Coast and California Klamath provinces, and the Special Designated Areas in the California Cascades (Table 2-6).

Table 2-6. Estimated maximum forest acres under barred owl management by province under Alternative 6.

Physiographic Province	Maximum Potential Forest Acres Under Barred Owl Management
Olympic Peninsula	0
Western Washington Cascades	0
Eastern Washington Cascades	0
Oregon Coast Ranges	0
Western Oregon Cascades	0
Eastern Oregon Cascades	0
Oregon Klamath	1,448,857
California Coast	1,723,053
California Klamath	3,833,474
California Cascades	961,336
Total	7,966,749

In the California spotted owl range, under this alternative, barred owl management would be focused on areas with the best remaining habitat and areas with higher fire resiliency. Implementing entities would identify the subject habitat on their lands for application of this alternative. Monitoring and barred owl management would focus on the 50 percent of the Sierra Nevada portion of the range with the best remaining habitat, and the 75 percent of the Coastal-Southern California portion of the range with the best remaining habitat and available access. Because habitat continues to be affected by fires, selection of the areas for this alternative would occur at the time of implementation, and could also change over time in response to new information or changes resulting from catastrophic events such as wildfire. Any barred owls detected during existing monitoring, research, and survey efforts, or anecdotal reports, within these selected areas would be removed. Outside of these selected areas, barred owls could be removed within three miles of any occupied California spotted owl site.



Map 2-9. Alternative 6. Northern and California spotted owl ranges.

2.9 Summary of Alternatives

Table 2-7. Summary description of alternatives in the northern spotted owl range.

Alternative	Maximum Forest Acres under Barred Owl Management	Provinces with Barred Owl Management	Barred Owl Management Approach	Map
1 - No Action	None	None	None	None
2 - Preferred Alternative	15,032,716	All	Northern spotted owl site management, Multiple GMAs, Special Designation Areas	2-2, 2-3, 2-4,
3 - Management Across the Range	25,721,475	All plus 15-mile buffer	Anywhere within the range and buffer	2-6
4 - Limited Management by Province/Population	9,751,105	All	Single GMA or Special Designated Area per province	2-7
5 - Management Focused on Highest Risk Areas	10,731,548	Olympic Peninsula, Western Washington Cascades, Eastern Washington Cascades, Oregon Coast Ranges, Western Oregon Cascades, Eastern Oregon Cascades	Two GMAs per province	2-8
6 - Management Focused on Best Conditions	7,966,749	Oregon Klamath, California Coast, California Klamath, California Cascades	GMAs, CA Cascades Management Zones	2-9

Table 2-8. Summary description of alternatives in the California spotted owl range.

Alternative	Sierra Nevada	Coastal-Southern California	Map
1 - No Action	None	None	None
2 - Preferred Alternative	Establish extensive inventory and monitoring network within northern invasion pathways. Remove all barred owls located by survey or monitoring.	Focus inventory/monitoring within the range and potential invasion pathways. Remove all barred owls located by survey or monitoring.	2-5
3 - Management Across the Range	Remove barred owls from range and 15-mile buffer, using existing survey and monitoring data.	Remove barred owls from range and 15-mile buffer, using existing survey and monitoring data.	2-6
4 - Limited Management by Province/Population	Remove barred owls when barred owls are being detected on 10 percent or more of an area.	Remove barred owls when barred owls are being detected on 5 percent or more of an area.	2-7
5 - Management Focused on Highest Risk Areas	Remove barred owls from the northern portion of the Sierra Nevada only.	None	2-8
6 - Management Focused on Best Conditions	Remove barred owls on up to 50 percent of the Sierra Nevada portion of the range with the best remaining habitat and around any occupied California spotted owl site.	Remove barred owls on up to 75 percent of the Coastal-Southern California portion of the range with the best remaining habitat and around any occupied California spotted owl site.	2-9

2.10 Alternatives Considered and Eliminated from Detailed Analysis

Some alternatives were considered but eliminated from detailed analysis (40 CFR 1502.14), including certain alternatives submitted during scoping (summarized in Chapter 5). In general, the reason for eliminating these alternatives or methods from full analysis included:

- Effects that were substantially the same as one of the fully analyzed alternatives.
- Alternative results would not meet the purpose and need.
- Technical or economic infeasibility.

2.10.1 Management in the vicinity of northern spotted owl sites only

In the range of the northern spotted owl, this alternative would target removal of barred owls at northern spotted owl sites, with emphasis on current and recently occupied sites and any new sites that are located. Barred owl management would not occur in the California spotted owl range. Management would include removal of barred owls within at least two home range radii (size varies by province), but this could be extended to three home range radii if the implementing entity chose to do so.

Reason for not analyzing in detail: Relative to northern spotted owls, this is a component of Alternative 2 and is analyzed with that alternative. Analysis of the effects of removing barred owls in the vicinity of northern spotted owl sites is contained in the analysis of Alternative 2.

Additionally, in areas where northern spotted owl populations are currently at very low levels, including in Washington and the northern approximately two-thirds of Oregon, barred owl management focused only on recently occupied sites would result in very small and isolated management areas, leaving the northern spotted owl population at high risk of extinction. Therefore, northern spotted owl site management alone would not meet the purpose and need.

2.10.2 Manage barred owls in Federal reserved land only

Under this alternative, we would focus barred owl management in Congressionally-reserved areas, including National Parks, National Monuments, National Wild and Scenic Rivers, and designated wilderness areas.

Reason for not analyzing in detail: Federal reserved lands were considered by the development team in the creation of the GMAs and other barred owl management areas under Alternative 2. Many Congressionally-reserved areas are designated in landscapes that are not capable of providing spotted or barred owl habitat (e.g., alpine areas), limiting the area available for barred owl management to support northern spotted owls. Congressionally-reserved lands that are capable of supporting these habitats were generally included in the GMAs. Therefore, the effect of barred owl management on these areas is substantially represented in the analysis of Alternative 2.

The portions of Congressionally-reserved lands that are capable of supporting spotted owls are scattered, and often in small patches when considered without adjacent forest lands. They are not well distributed across some of the provinces. The limited road and trail access further limits the ability to implement barred owl management on these areas. By themselves, they could not provide stable spotted owl populations across the range of the two subspecies and would not meet the purpose and need.

2.10.3 Manage barred owls only in critical habitat

Under this alternative, barred owl management would occur only in areas designated as critical habitat for the northern spotted owl. Northern spotted owl critical habitat is currently limited to public lands (Federal and State) and substantially overlaps with the barred owl management areas in Alternative 2. There is no designated critical habitat for the California spotted owl.

Reason for not analyzing in detail: This approach would be limited to the northern spotted owl range and so it would not meet the purpose and need with respect to California spotted owls. As to northern spotted owls, 91 percent of critical habitat is included in the barred owl management areas (GMA and Special Designations) of Alternative 2. Therefore, the effects of this alternative would be substantially the same as the effects of Alternative 2.

2.10.4 Nonlethal removal methods

Nonlethal removal involves capture and transport of barred owls out of the management area. This requires a location to place the captured birds, either in the wild or in captivity. In development of the Barred Owl Removal Experiment (USFWS 2013, entire) we examined several placement options based on two general approaches: translocation and release to the wild, or captivity. The results of that analysis remain relevant for this analysis.

We examined two options for translocation releases: release into areas within the western U.S., and release in their historical range in the eastern U.S. Given the barred owl's invasive nature and potential impact on a wide array of prey, we eliminated the option of releasing barred owls in the west, whether within or outside the spotted owl ranges. Their ability to travel long distances could also lead to the return of translocated barred owls to the range of the spotted owl. We contacted State agencies in the historical range of the northern barred owl, the subspecies of barred owls found in the northwest, to determine if they were interested in receiving barred owls for relocation (USFWS 2013, p. 21 and Appendix C). None of the responding States expressed interest in receiving captured barred owls; the primary reason being lack of empty habitat within which to place barred owls, coupled with concerns for the potential to introduce new diseases or parasites from the west. There was also concern that the genome of barred owls in the west, after over 100 years of intensive selective pressure, would not match local barred owl populations in the east and could disrupt their natural variation. Therefore, translocation is not a viable option.

The remaining option is permanent captivity. Maintaining owls in captivity in a humane and safe environment is difficult and expensive. Owls require specialized facilities, caging, and care. Therefore, the most likely potential for humane captive holding would be by zoo, zoological parks, and similar facilities. As a result, we anticipate the ability to place few barred owls. We would not capture barred owls without a location ready to accept them. Therefore, we could not remove sufficient barred owls under this approach to meet the purpose and need.

2.10.5 Reproductive interference

Another method we considered for managing barred owls was to prevent barred owl reproduction. This is generally done by destroying nests, removing eggs from nests, rendering eggs unviable (e.g., oiling eggs), surgical sterilization, or immuno-contraceptive vaccines. All of these methods would be intended to prevent reproduction while leaving barred owls in place until they die. Hazing at nest sites has been used with some birds to reduce reproductive success, though this has not been tested with barred owls. Barred owls are not particularly susceptible to disturbance, as indicated by their presence in urban settings, so hazing is likely not an effective way to prevent barred owl reproduction.

We dismissed the prevention of barred owl reproduction from detailed analysis for the following reasons. While these approaches could eventually cause the territorial barred owl population to decline, this would only occur after the existing territorial birds die and external sources of recruits decline. This could require well over a decade given the lifespan of barred owls. During this time, the barred owls would remain on the landscape and continue to exclude spotted owls from their territories, thereby preventing spotted owl reproduction and reducing their survival

rate. By the time barred owl populations dropped to a level where spotted owls could establish territories, the spotted owls would have died. We would be very unlikely to be able to reduce reproduction by barred owls over an area large enough that dispersers (which may travel long distances) would not be able to successfully replace those barred owls dying of natural causes. We would therefore not reduce the barred owl conflicts with spotted owls. Thus, reproductive interference would not meet the purpose and need.

Finding nests and removing or destroying eggs would require that we are able to locate nests early in the nesting season every year, track any renesting efforts, and access those nests to remove, oil, or destroy the eggs. Finding barred owl nests is difficult and missing even a few would provide replacements for any older barred owls that die, resulting in a lack of empty sites for spotted owls to colonize. Many barred owl nests are in snags or otherwise structurally-compromised trees, making climbing these trees to access the eggs very dangerous. It would be nearly impossible to effectively reduce the barred owl influence on enough spotted owl pairs to support spotted owl populations, making this approach technically infeasible.

Sterilization can be accomplished by chemical or physical methods. For chemical sterilization, depending on the method of administering agents for sterilization, spotted owls could be exposed to sterilizing agents. This could reduce spotted owl reproduction, which could result in further spotted owl population decline or extirpation. Physical sterilization would require capture and handling of every barred owl in the management area. In most cases this would require capture of all the territorial barred owls, or at least one member of all pairs, across a large area, which would be very expensive. Unless we succeed in sterilizing all of the barred owls in the area, there would still be young produced that would be present to recolonize sites when the territorial barred owls died. If even one pair in an area could not be captured, they could produce several young per year. Capture and sterilization would also be stressful on wild birds and these methods would also involve risks of unintended mortality. This approach would be technically and economically infeasible.

2.10.6 Habitat management

We evaluated whether there were habitat management methods that could be applied to reduce the impact of barred owls on spotted owls. We considered two approaches, one that would create habitat conditions favoring spotted owls over barred owls, and another involving the maintenance of habitat to provide more opportunities for both species to survive.

For forest management to favor spotted owls, there would need to be forest conditions under which spotted owls had a competitive advantage over barred owls and that we could manage for these conditions in the short term. Unfortunately, to date, barred owls have shown the capacity to occupy all forest conditions used by spotted owls, and to displace spotted owls in all of these forest conditions. While there may be some differences in the forest conditions selected when barred owl populations are low, and barred owls have not displaced spotted owls as rapidly in some areas and under some conditions, the eventual result is exclusion of spotted owls.

While the presence of high-quality spotted owl habitat may assist individual spotted owls in remaining on a site, habitat management alone cannot prevent the eventual exclusion of spotted

owls from these habitats (Franklin et al. 2021, p. 18). The purpose and need for this action is focused on the threat from barred owls. Other threats, such as habitat loss, are being addressed through other processes, such as the Recovery Plan for the Northern Spotted Owl, the Conservation Strategy for the California Spotted Owl, Federal land management plans, and critical habitat designations.

2.10.7 Alternatives to use of firearms to remove barred owls

We also considered alternatives to the use of firearms to lethally remove barred owls, such as the use of toxicants (poison) and capture with euthanasia.

There are no toxicants registered for use by EPA for owls in the United States. Therefore, we could not use toxicants at this time, leaving nothing to analyze. If one were to become available, we deem the use of toxicants to be too dangerous to other species in this situation as it would be difficult to ensure delivery only to the specific barred owl that is the focus for removal, and there could be a potential for secondary poisoning from scavenging of the carcass. The result for the barred owls would not be substantially different from lethal removal using firearms.

Capture and euthanasia of barred owls would be an optional technique allowed under the protocol for removal of barred owls (Appendix 2) in areas where firearm use is inadvisable for safety reasons or other concerns. However, this would result in additional stress for the birds and would be relatively inefficient, resulting in substantially higher costs. Thus, we do not consider this the preferred or primary removal method. While this would be a component of removal, the result for the barred owls would not be substantially different from lethal removal by firearm.

2.10.8 Reduced number of barred owls removed

We considered several options that would focus on removing fewer barred owls per land area managed. These options include various levels of partial removal of barred owls and eliminating the removal of hybrids.

Removal of only a portion of the barred owl population in a management area would occur under all removal scenarios, particularly in areas with moderate to high barred owl densities. In any specific area, some barred owls would likely not be removed each year due to accessibility, weather, and other issues. Removal studies to date have focused on as complete removal as possible and have shown success under this approach. Intentional partial removal has not been tested.

Deliberately leaving territorial barred owls within a management area would likely result in the production of more barred owls within the management area, thereby allowing for more or quicker recolonization by barred owls of sites cleared of territorial barred owls and reduced opportunity for spotted owls to reclaim sites. This would reduce the effectiveness of barred owl removal. Over time this could actually lead to the need to remove more barred owls in total as dispersing barred owls recolonize sites and must be removed. If in the less than full removal of barred owls was shown to be effective for spotted owl recovery, the removal protocol allows for this option.

Limiting removal to non-hybrid barred owls, and excluding removal of spotted/barred owl hybrids, would not significantly change the number of owls removed because hybrids are very uncommon in most areas. For example, over the course of the barred owl removal experiment, we removed only one hybrid owl and positively identified one other on the three Washington and Oregon study areas that included 300 historic spotted owl sites. Therefore, the effect of removing hybrids as well as barred owls is substantially similar to the alternatives analyzed. However, hybrids do have the same effect on spotted owls, through competitive exclusion, as genetically homogenous barred owls. In addition, allowing hybrids to remain in areas could lead to an increase in hybrids, and the introgression of barred owl genes into the spotted owl genome, potentially resulting in loss of genetic identity. See Section 2.3.1.1 for additional discussion of the effect of barred x spotted owl hybrids on spotted owls.

2.10.9 Limit competition for food between spotted and barred owls

This approach assumes that competition for food is the primary factor leading to exclusion of spotted owls by barred owls. While impacts on the prey base from barred owl predation may be contributing to the inability of spotted owls to survive and maintain occupancy in a territory, direct physical competitive exclusion by barred owls is the likely primary factor affecting the ability of spotted owls to retain territories. Supplemental feeding of spotted owls would not remove the impact of competitive exclusion. Supplemental feeding of barred owls, to reduce their impact on natural prey base, could actually increase reproductive success of barred owls, increasing their populations, which is counter-productive to the purpose and need of the proposed action. Therefore, these approaches would not reduce barred owl impacts on spotted owls and would not meet the purpose and need.

2.10.10 Northern spotted owl captive propagation or translocation

Captive breeding or translocation of spotted owls could bolster spotted owl populations in the wild and could be a valuable component of a larger spotted owl recovery strategy. To be successful, these approaches would require the availability of spotted owl habitat with reduced barred owl competition, as would be provided by any of the alternatives. However, the actual captive propagation or translocation would be outside the scope of this action and would require additional Federal action, including additional analysis and permitting.

Chapter 3 - Affected Environment and Environmental Consequences

This chapter provides a description of the analysis area and the current conditions that could be affected by the proposed action or action alternatives (affected environment), and a comparative analysis of the potential effects to the human environment (environmental consequences) of each alternative. For the purposes of this FEIS, "effect" is synonymous with "consequence" and "impact," and effects may be beneficial (positive) or adverse (negative). We identified potential effects for the following areas: barred owls, spotted owls, other wildlife species, recreation and visitor use, wilderness, socioeconomics, and climate change. Effects to other resources were considered but dismissed from detailed analysis because there are not likely to have significant effects on public health and safety, cultural resources, Tribes, ethical considerations, environmental justice, or geology, soils, water, vegetation, or air quality. Cumulative effects are described in Chapter 4.

3.1 Analytical Methodologies and Assumptions

This section describes the overall temporal and spatial scale of analysis for this FEIS, as well as key analytical assumptions that are common to all analyses. The individual sections of this chapter and accompanying appendices include assumptions that are specific to that resource.

The CEQ's regulations for implementing NEPA direct that NEPA documents "discuss impacts in proportion to their significance. There shall be only brief discussion of other than significant issues" (40 CFR 1502.2(b)). In considering the significance of potential effects, this analysis addresses the degree and duration of beneficial and adverse effects and whether any effects would violate Federal, State, Tribal, or local law protecting the environment.

The regulations also require that an EIS disclose the direct, indirect, and cumulative effects on the quality of the human environment of a proposed action or alternative. Direct effects are those effects that are caused by the action and occur at the same time and place (40 CFR 1508.1(g)(1)). Indirect effects are those effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR 1508.1(g)(2)). Cumulative effects are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.1(g)(3)).

3.1.0 Changes between Draft and Final EIS

- Revised the assumptions for the initial implementation schedule.

3.1.1 Common to All Action Alternatives

All action alternatives include issuance of a Special Purpose permit under the MBTA for take of barred owls to implement the proposed Strategy. We assess direct and indirect effects in this chapter, and cumulative effects in Chapter 4.

As described in Chapter 2, none of the alternatives analyzed require or direct changes to underlying land management for any landowner, and thus should not conflict with the objectives of Federal, regional, State, Tribal, and local land use plans, policies, and controls for the area concerned. Any implementation actions would be limited to lands of willing landowners or land manager participants. Although the specific timing, size, location, and design of future implementation actions that would occur under each alternative are not certain, we can project a reasonable forecast of how actions expected under the barred owl management direction of each alternative would affect the human environment. The analysis also considers best management practices that may be implemented to avoid, mitigate, or reduce adverse effects where applicable and in accordance with existing regulatory requirements, such as required training for removal specialists to avoid impacts to non-target species and timing restrictions on removal efforts to reduce impacts to marbled murrelets. Effects on short-term use of the environment and long-term productivity of the forest are addressed as part of the environmental consequences in this chapter.

Analysis of effects of any of the action alternatives includes projecting future implementation actions by multiple entities. It is not possible to forecast the duration of the barred owl management activities themselves. The MBTA Special Purpose permit can be issued for up to three years but can be renewed. For the purposes of the analysis of the action in this FEIS, we chose a temporal scale of analysis of 30 years. This period of time represents two lifespans of a spotted owl and allows sufficient time to predict and analyze discernable differences in effects to resources across alternatives.

Given the timing of the decision and the effort required to develop barred owl management areas, train personnel, and fund activities, for the purpose of this analysis, we assume a maximum of 10 percent implementation in year 1, 50 percent in year 2, and full implementation in year 3 and beyond in the northern spotted owl range. Given the focus on removing all located barred owls and the smaller number involved, we assume full implementation starting in year 1 for the California spotted owl range.

3.2 Description of the Affected Environment

All management actions described in this FEIS are focused on managing one forest species, barred owl, for the conservation of another forest species, spotted owl. Therefore, the barred owl management actions would occur on forest landscapes within the areas described for the affected environment. In all alternatives, the existing forest management direction or designations determined by each separate landowner or manager are assumed to continue.

For all action alternatives considered in this FEIS, barred owl management actions would occur across the range of the northern and California spotted owls, at various levels and in various locations, depending on both the focus of the alternative and the implementation decisions of the agencies involved. The Affected Environment is the area where implementation of an alternative

could affect different aspects of the human environment (including the natural and physical environment). Barred owl management actions and the affected environment vary between the range of the northern and California spotted owl, and so would be addressed separately in most cases within this chapter.

Implementation of action alternatives could have temporary and limited effects on certain resources outside the barred owl management areas themselves. For example, the sound of gunshots from barred owl management activity may carry outside the management areas, or shifts in barred owl populations may occur within a few miles of management areas as these birds may move into areas cleared of territorial barred owls. Any effects beyond the boundaries of the barred owl management areas are described further for each resource.

3.2.0 Changes between Draft and Final EIS

- Updated the data tables based on the latest spotted owl habitat data (2024) and revisions to the alternatives described in Chapter 2.

3.2.1 Area of Analysis: Northern spotted owl range

Environmental effects of the alternatives are considered at two scales within the northern spotted owl range. These include landscape scale by physiographic province (province) and mapped barred owl management areas.

At a landscape scale, the analysis of effects is provided at the province level (Map 2-1), Table 3-1). Ownership of the lands varies by province, including Federal agencies, State agencies, other government, and private lands (Table 3-2). Within the Federal lands, the primary land managing agencies are the U.S. Forest Service (Forest Service), Bureau of Land Management (BLM), and the National Park Service (NPS) (Table 3-3). For all analyses, the forested margins of the Willamette Valley province were added to the adjacent provinces.

We also evaluated the effects of the action alternatives at the mapped management area scale. These barred owl management areas are described in Section 2.3.4. and displayed on Maps 2-2, 2-3, and 2-4. Action alternatives may include different combinations of these management areas and different levels of barred owl management within the areas.

In addition, for Alternative 3, we have included a barred owl management zone for 15 miles around the borders of the subspecies range (Map 2-6).

Thus, for the purposes of this FEIS, the affected environment is made up of the range of the northern spotted owl, including mapped barred owl management areas and spotted owl site management areas, and a 15-mile additional management zone. The affected environment for each alternative is made up of varying combinations of barred owl management areas and scales.

Table 3-1. Total acres for land base, forest lands, and spotted owl habitat within each physiographic province included in this analysis. Spotted owl habitat is derived from the 2024 Cover Type Suitability GIS layer (Davis et al. 2024).

Physiographic Province	Total Acres in Land Base	Forest Acres	Spotted Owl Habitat Acres
Olympic Peninsula	3,034,555	2,721,994	847,671
Western Washington Cascades	6,154,074	5,259,617	1,592,735
Eastern Washington Cascades	5,691,079	4,213,859	730,198
Oregon Coast Range[1]	5,827,250	5,228,622	854,139
Western Oregon Cascades[1]	6,645,785	6,250,177	2,266,430
Eastern Oregon Cascades	2,382,593	2,087,403	317,326
Oregon Klamath	4,003,341	3,619,558	1,287,732
California Coast	5,694,290	3,915,313	1,145,692
California Klamath	6,089,224	5,531,309	1,566,458
California Cascades	2,500,969	1,976,883	295,062
Western Washington Lowlands	6,515,511	4,529,737	129,531

[1] For this analysis, the Oregon Coast Range and Western Oregon Cascades provincial data do not include the adjacent forested margin of the Willamette Valley province as they do in other analyses.

Table 3-2. Distribution of lands by percent of ownership in the physiographic provinces.

Physiographic Province	Total Acres	Federal	State	Tribal	Other Government	Private
Olympic Peninsula	3,034,555	51%	13%	8%	1%	27%
Western Washington Cascades	6,154,074	61%	11%	<1%	1%	27%
Eastern Washington Cascades	5,691,079	64%	9%	15%	<1%	12%
Oregon Coast Range[1]	5,827,250	24%	12%	<1%	1%	63%
Western Oregon Cascades[1]	6,645,785	68%	1%	<1%	<1%	31%
Eastern Oregon Cascades	2,392,561	69%	2%	11%	<1%	18%
Oregon Klamath	4,003,341	53%	1%	<1%	<1%	46%
California Coast	5,694,290	9%	6%	1%	3%	81%
California Klamath	6,089,224	76%	<1%	2%	<1	22%
California Cascades	2,500,969	46%	1%	<1%	<1%	53%
Western Washington Lowlands	6,515,511	1%	9%	1%	3%	85%
TOTAL	54,548,639	45%	6%	1%	1%	47%

[1] For this analysis, the Oregon Coast Range and Western Oregon Cascades provincial data do not include the adjacent forested margin of the Willamette Valley province as they do in other analyses.

Table 3-3. Distribution of Federal lands by percent of Federal lands in the physiographic provinces.

Physiographic Province	Total Acres	US Forest Service	Bureau of Land Management	National Park Service	Other Federal
Olympic Peninsula	1,541,428	41%	0%	59%	0%
Western Washington Cascades	3,776,636	79%	0%	21%	0%
Eastern Washington Cascades	3,620,756	95%	0%	4%	1%
Oregon Coast Range	1,428,917	44%	54%	0%	2%

Physiographic Province	Total Acres	US Forest Service	Bureau of Land Management	National Park Service	Other Federal
Western Oregon Cascades	4,510,683	82%	16%	2%	0%
Eastern Oregon Cascades	1,654,840	90%	3%	6%	1%
Oregon Klamath	2,120,057	61%	39%	0%	0%
California Coast	491,663	14%	55%	30%	1%
California Klamath	4,620,910	96%	3%	1%	0%
California Cascades	1,139,407	94%	5%	0%	1%
Western Washington Lowlands	32,980	3%	3%	16%	78%
TOTAL	23,398,918	79%	11%	9%	1%

3.2.2 Area of Analysis: California spotted owl range

Because barred owl populations are not yet well established in the range of the California spotted owl, barred owl management in their range is focused on locating and removing barred owls before this happens under all action alternatives. Barred owl management is focused on the range of this subspecies, including the spotted owl populations in the Sierra Nevada and Coastal-Southern California. Additionally, all alternatives allow barred owl management in the areas adjacent to the current range that may represent potential pathways for the invasion of barred owls into the California spotted owl range (Map 2-5).

For the Sierra Nevada population, potential pathways for invasion include portions of the South Cascades, Shasta Modoc, and Eastern Sierra Invasion Pathways (Map 2-5). A secondary pathway may occur through the riparian areas of the Central Valley. For the Coastal-Southern California population, the potential invasion pathways include the Sierra-Southern California Invasion Pathway (along the border closest to the Sierra Nevada province), the Coastal Invasion Pathway (south of San Francisco, both west and east of the California spotted owl range (Map 2-5)), and lands immediately surrounding or falling between the disjunct islands of the Coastal-Southern California spotted owl range.

Therefore, environmental effects of the action alternatives may occur at any time or place within the range of the subspecies or potential invasion pathways. Effects of barred owl management would be limited to forested areas, though these may include small patches of forest in invasion pathways.

3.3 Barred Owl

Our discussion of the effects of the proposed management on barred owls is focused on the range of the northern and California spotted owls, and adjacent areas described for management. Barred owls are found in areas outside of these areas but would not be affected by this action. For each alternative we describe the anticipated effects to barred owls, including the maximum number of barred owls we estimate would be removed, and the overall effects to barred owl populations from removal at the provincial, regional, and range-wide scales.

3.3.0 Changes between Draft and Final EIS

- Revised the approach to calculating the potential number of barred owls removed based on changes to the implementation schedule (Section 3.1). See Appendix 3 for details.
- Updated the data tables based on revisions to the alternatives described in Chapter 2.

3.3.1 Background and Analytical Methods

For the purpose of this analysis, and to effectively illuminate differences in the outcomes under the alternatives, we assumed that barred owl management would begin immediately, be implemented at 10 percent in year 1, 50 percent in year 2, and to the maximum extent, thereafter, as described in each alternative. The analysis covers 30 years, which represents two lifespans of spotted and barred owls and allows time to predict and analyze differences between alternatives.

As a result of differences in the available data and condition of barred owl populations in the northern and California spotted owl range, we used a different analysis approach in each area.

Northern spotted owl range

We estimated the maximum number of barred owls that would be removed under each action alternative using the methodology described in detail in Appendix 3. Using this methodology, we estimated the number of barred owls currently occupying each province and management area, based on the density of barred owls described below (Table 3-4 and 3-5).

To estimate the maximum number of barred owls removed, we assumed a 90 percent annual removal rate of barred owls within management areas, and an annual rate of new barred owls into the territorial population that accounts for dispersing juveniles and subadults moving into the management area over time. For each alternative, we estimated the number of barred owls to be removed from each management area, province, or range the first year and the annual average over the 30 years of the analysis.

For each province other than the California Cascades, we report the percentage of potential barred owl habitat (as represented by acres of forest lands) and populations under management in each alternative, and the percentage of the barred owl population that would not be managed. For example, if an alternative includes removal on 50 percent of the forest lands in the range of the northern spotted owl, we estimate that we would be removing 50 percent of the barred owl population and leaving 50 percent of the barred owl population unmanaged. Note that this represents the initial estimated population of barred owls as of 2024. This population would likely continue to grow within the non-managed areas until it reached the carrying capacity for the habitat. We do not attempt to provide projected barred owl population numbers for these unmanaged areas, as there are no data yet available to estimate the rate of growth or the final carrying capacity of different areas that would cap the eventual number of barred owls.

In the California Cascades Province, where barred owls are not yet well established, we use an estimate of the current barred owl population derived from ongoing barred owl removal experiments. This province is also one of the leading potential pathways of barred owl invasion into the California spotted owl range. Thus, the focus for barred owl management is on the

location and removal of all barred owls in this province. Based on past removal experiments in this area, and the proportion of the province involved, we anticipate removal of 42 barred owls per year under the preferred alternative.

There are few population estimates for barred owls across their entire range and no wide-ranging systematic monitoring. The range-wide population estimates that exist rely on data not specifically designed to detect owls, however, these remain the best available information. The Partners in Flight Population Estimate Database (https://pif.birdconservancy.org/population-estimate-database-scores/ - accessed September 27, 2023) estimates the global population at 3.5 million (95 percent confidence limits of 3.0 to 3.9 million), all of which occurs within North America. We used this estimate to put the effects of each alternative on barred owl populations in context. In addition, to provide another approach to describe range-wide effects to barred owls, we estimated the proportion of the entire North American barred owl population (based on range maps) affected by each alternative. For example, the range of the northern spotted owl is estimated to represent approximately 3 percent of the total range of the barred owl, so if 50 percent of the northern spotted owl range is potentially under management, barred owl management could occur on up to 1.5 percent of the global barred owl range.

California spotted owl range

As noted above, we have insufficient information to allow for an accurate estimate of the current barred owl population across the range of the California spotted owl. We do know that, under current research permits, between 10 and 15 barred owls have been removed each year since 2020 in the Sierra Nevada. This may represent a low approximation of the current territorial barred owl population in the Sierra Nevada. Even so, we consider this to represent the bulk of the territorial barred owl population and anticipate these removal levels would continue at this rate for the next 10 years if monitoring and removal are implemented. This is generally consistent with the reported number of new individual barred owls and barred owl/spotted owl hybrids reported between 2007 and 2017 (Keane et al. 2018). Because this is based on detected and reported barred owls, and not all areas are well surveyed, this may represent a low estimate of the annual territorial barred owl population. Therefore, under full removal alternatives, we assumed the potential annual removal rate at the start of barred owl management would be 30 barred owls per year for the Sierra Nevada. Removal would not be evenly distributed across the Sierra Nevada.

Given the lack of substantial self-reproducing populations of barred owls in the Sierra Nevada at this time, most barred owls that become territorial, and therefore subject to removal, in the California spotted owl range are likely the result of long-distance dispersal and invasion from the range of the northern spotted owl where substantial reproductive barred owl populations exist, rather than local reproduction. However, as barred owl populations in the range of the northern spotted owl continue to increase, we expect dispersal/invasion rates into the California spotted owl range to increase. For the analysis of alternatives, we assumed the number of barred owls that may be removed under each alternative would increase by 1.2 times the second decade, and 2.4 times the third (see Appendix 3 for more details).

The number of barred owls removed in management areas under each alternative would derive

from the proportion of the range involved in removal. Based on the past invasion history, we anticipate that barred owls would be more common in the areas nearer the source population, and therefore, where barred owl management is applied across a portion of the Sierra Nevada in an alternative, we assumed 75 percent of the barred owl population would occur in the northern third of the province and is therefore where 75 percent of the removal would also occur.

To date no barred owls have been detected in the Coastal-Southern California portion of the range, though this may be due in part to limited survey efforts. Given the early stage of invasion and the smaller area of barred owl management related the Coastal-Southern California range, we anticipate a maximum annual removal in the first decade of five barred owls per year, increasing at the same level described for the Sierra Nevada (see Appendix 3 for more details).

3.3.2 Affected Environment

As described in Chapter 1, barred owls are native to eastern North America and were historically found east of the Great Plains, with a subspecies in central Mexico. Barred owl populations began to expand westward in the early 1900s, reaching the range of the northern spotted owl in the 1960s in British Columbia, Canada. Barred owls established breeding populations and continued to expand southward. The first reports of individual barred owls in the range of the northern spotted owl in the U.S. were in western Washington in 1973 (Hamer et al. 1989, p. 2; Taylor and Forsman 1976, p. 560), Oregon in 1974 (Taylor and Forsman 1976, p. 560), and California in 1976 (Livezey 2009a, p. 51). Barred owls are now found throughout the northern spotted owl range (Wiens et al. 2021, p. 7) and occur in high densities in the northern portion of the range. Individuals and small populations of barred owls have been found in the Sierra Nevada within the California spotted owl range (Keane et al. 2018, p. 5). For more detail, see Appendices 1 and 2.

Barred owls remain present and relatively common in their historical range in eastern North America. They are found in the southern edge of the boreal forest, and the forest of western Canada, Alaska, and the northern Rocky Mountains. As described above, they are now found in the Cascades and coastal mountains of Washington, Oregon, and northern California, and have recently extended their range into the Sierra Nevada. They occur in a wide variety of forest conditions, including forest patches in cities.

Northern spotted owl range

We used data from studies that included barred owl surveys to estimate the density of barred owls in the range of the subspecies, then used that data to estimate the baseline barred owl populations in the provinces and management areas as of 2024 as follows.

Based on density data from the control areas of the Barred Owl Removal Experiment (Wiens et al. 2021) and from the Willow Creek study area, barred owl densities were estimated in Table 3-4. Note that barred owl populations in many areas would continue to increase and these numbers reflect only the estimated initial population density for 2024.

Table 3-4. The estimate of the density of territorial barred owls on study areas with extensive barred owl surveys. This does not account for non-territorial barred owls.

Study Area	Physiographic Province	Control Area Acres	Estimated Number in Control Area for Highest Year	Number Detected per 1,000 Acres
Cle Elum	Eastern Washington Cascades	134,672	182	1.35[1]
Oregon Coast Ranges	Oregon Coast Ranges	219,924	635	2.89[1]
Union/Myrtle-Klamath	Oregon Klamath	150,734	384	2.55[1]
Willow Creek	California Klamath	56,241	31	1.19[2]

[1] For the Cle Elum, Oregon Coast Ranges, and Union/Myrtle Study Areas, territorial barred owl densities were estimated for the years 2021-2023 using extrapolation of the linear annual time trend from the survey years (Wiens pers comm. 2023).
[2] For the Willow Creek, the estimate represents adjusted territorial barred owl densities from 2019, the last year of barred owl surveys on the study area. (A. Franklin pers comm. 2023).

We extrapolated the population of barred owls across each physiographic province using the density from the study areas with the most similar forest conditions and historical presence of barred owls, adjusting where necessary due to substantially different conditions or history. Using these densities (Table 3-4) and the acres of forest land in each province, we estimated the potential current barred owl population in each province (Table 3-5). Given that these data are limited to four study areas and are extrapolated across large landscapes, these should be considered general estimates. For the California Cascades province we used data from barred owl removal experiments to estimate the removal of barred owls within the province. For Marin and Sonoma Management Zone, we utilized local information and expertise to estimate the number of barred owls present at the start of implementation. All discussion of barred owl abundance in this FEIS within the range of the northern spotted owl are based on this methodology, allowing for comparison across alternatives (for details on this see Appendix 3). Using the same methodology, we estimated the current population of barred owls in each mapped management area (Table 3-6).

Table 3-5. Estimate of potential baseline barred owl populations by physiographic province in the northern spotted owl range as of 2023.

Physiographic Province	Study Area Data Applied	Estimated Number of Barred Owls Detected per 1,000 Acres	Acres of Forest Lands	Estimated Initial Population of Barred Owls
Olympic Peninsula	Oregon Coast Ranges	2.89	2,721,994	7,867
Western Washington Cascades	Oregon Coast Ranges	2.89	5,259,617	15,200
Eastern Washington Cascades	Cle Elum	1.35	4,213,859	5,689
Western Washington Lowlands	Oregon Coast Ranges	2.89	4,529,737	13,091
Oregon Coast Ranges	Oregon Coast Ranges	2.89	5,492,609	15,874
Western Oregon Cascades	Oregon Coast Ranges	2.89	6,557,711	18,952
Eastern Oregon Cascades	Cle Elum	1.35	2,087,403	2,818
Oregon Klamath	Union/Myrtle-Klamath	2.55	3,619,558	9,230
California Coast	Willow Creek	1.19	3,915,313	4,659
California Klamath	Willow Creek	1.19	5,531,309	6,582
California Cascades	Local Information	Local Information	1,976,883	200
TOTAL			45,905,993	100,162

Table 3-6. Estimate of potential baseline barred owl populations by mapped areas in the northern spotted owl range.

Physiographic Province	Block Name	Number of Barred Owls Detected per 1,000 Acres	Acres of Forest Lands	Estimated Starting Population of Barred Owls
Olympic Peninsula	Olympic GMA	2.89	1,206,151	3,486
	Olympic Hoh-Clearwater SOSEA	2.89	359,406	1,039
Western Washington Cascades	Central WA West Cascades GMA	2.89	654,931	1,893
	South WA West Cascades GMA	2.89	1,101,665	3,184
	North WA West Cascades GMA	2.89	903,600	2,611
	Canadian Connector	2.89	745,184	2,154
	Central Connectivity Area WA Cascades West	2.89	265,754	768
	Finney Block SOSEA	2.89	58,502	169
	Mineral Block SOSEA	2.89	105,057	304
	Mineral Link SOSEA	2.89	155,877	450
	Columbia Gorge SOSEA	2.89	31,899	92
Eastern Washington Cascades	Central WA East Cascades GMA	1.35	1,137,645	1,536
	North WA East Cascades GMA	1.35	452,374	611
	South WA East Cascades GMA	1.35	662,301	894
	White Salmon SOSEA	1.35	44,910	61
Oregon Coast Ranges	Central OR Coast Ranges GMA	2.89	1,724,821	4,985
	North OR Coast Ranges GMA	2.89	1,113,267	3,217
	South OR Coast Ranges GMA	2.89	298,931	864
Western Oregon Cascades	H.J. Andrews GMA	2.89	1,273,146	3,679
	South OR West Cascades GMA	2.89	1,030,595	2,978
	Mount Hood West GMA	2.89	765,716	2,213
	Calapooya Connectivity Area	2.89	986,011	2,850

Physiographic Province	Block Name	Number of Barred Owls Detected per 1,000 Acres	Acres of Forest Lands	Estimated Starting Population of Barred Owls
	Santiam Connectivity Area	2.89	507,261	1,466
	Cascade-Siskiyou Connectivity Area	1.35	196,943	266
Eastern Oregon Cascades	Deschutes GMA	1.35	683,833	923
	Mount Hood East GMA	1.35	401,858	543
	South OR East GMA	1.35	353,120	477
Oregon Klamath	North OR Klamath GMA	2.55	755,556	1,927
	South OR Klamath GMA	2.55	516,220	1,316
	West OR Klamath GMA	2.55	660,033	1,683
California Coast	North CA Coast GMA	1.19	679,747	809
	Central CA Coast GMA	1.19	879,473	1,047
	South CA Coast GMA	1.19	738,184	878
	Marin/Sonoma Management Zone[1]	Local Estimate	587,434	70
California Klamath	Northwest CA Klamath GMA	1.19	902,936	1,074
	Central CA Klamath GMA	1.19	1,232,535	1,467
	North CA Klamath GMA	1.19	608,764	724
	Northeast CA Klamath GMA	1.19	1,500,431	1,786
	South CA Klamath GMA	1.19	866,632	1,031
California Cascades	California Cascades Province-wide removal	Local Estimate	1,976,883	200
Total				57,725

[1] The Marin/Sonoma County Management Zone and the California Cascades Province are likely substantially substantial overestimate as it is based on data from areas with greater barred owl populations. We utilized local information to estimate the starting population of barred owls in this area.

California spotted owl range

As barred owls continued to expand south, they reached the range of the California spotted owl as early as 1989. Between 1989 to 2013, a total of 51 barred owls and 27 barred owl/spotted owl hybrids had been detected in the Sierra Nevada (Gutiérrez et al. 2017, p. xxv). By 2017, the cumulative number of barred and barred owl/spotted owl hybrid detections in the Sierra Nevada increased to approximately 145 (Keane et al. 2018, p. 7), with another 2.6-fold increase between 2017 and 2018 (Wood et al. 2020, p. 4). Note, this is the cumulative number of barred and hybrid detections reported over time; this does not represent the current barred owl population and many of these sites are no longer occupied by barred owls. Between 2018 and 2020, 76 barred owls or barred owl/spotted owl hybrids were removed from the Sierra Nevada, including 65 from the

northern portion, 10 from the central, and 1 in the southern Sierra Nevada. Removal of detected barred owls continues as part of ongoing research in the Sierra Nevada at a rate of 10 to 15 barred owls per year (2020-2022).

There is insufficient information to allow for an accurate estimate of the current barred owl density or population in the Sierra Nevada portion of the California spotted owl range at this time. The 10 to 15 barred owls removed each year since 2020 represent a minimum estimate of the current territorial barred owl population in the Sierra Nevada each year. To date, no barred owls have been detected in the Coastal-Southern California portion of the range, though this may be partly due to limited survey efforts. Still, we anticipate that birders, landowners, land managers conducting California spotted owl surveys, and other interested parties would be reporting sightings if there were more than a very few individuals in the area as territorial barred owls are very vocal and easily identified.

3.3.3 Environmental Consequences

The following sections present the potential environmental effects of the no action alternative, proposed action, and alternatives on barred owl populations. Methodologies and underlying data vary between the northern and California spotted owl ranges, therefore we address these separately for each of the action alternatives.

3.3.4 Alternative 1 – No Action

Under the no action alternative, no systematic barred owl management strategy would be finalized or implemented, and the Service would not obtain an MBTA permit for management of barred owls. Barred owls would continue to expand within the northern spotted owl range, causing a further decrease in spotted owl populations, likely resulting in extirpation of spotted owls in large portions of their range and eventual extinction of the northern spotted owl subspecies.

Barred owls would continue to move into the California spotted owl range from the north. Based on the history of the barred owl invasion in the northern spotted owl range, we anticipate that increase in barred owls may be slow in the first decade, particularly in the southern Sierra Nevada and the Coastal-Southern California portion of the range. However, once reproductive barred owl populations are established within the subspecies' range, we anticipate that barred owl populations would begin a rapid growth phase.

For purposes of this analysis, we assumed that under the no action alternative, barred owl removal would continue in some areas under other ongoing or future research efforts. Research involving barred owl removal has been conducted in all three States in the past and is currently underway in California for both northern and California spotted owls. Additional research efforts may be initiated in the future that involve removal of barred owls and require an MBTA permit. However, research is, by its nature, relatively short-term and we have no way to estimate the number, extent, location, or duration of those future decisions as permits are processed as they come in from outside requesters.

3.3.5 Alternative 2 – Preferred Alternative – Proposed Strategy Implementation

Alternative 2 includes removal of barred owls from management areas across the provinces in the range of the northern spotted owl. These include areas around all recently occupied and newly located spotted owl sites, management of portions of General Management Areas based on their priority rating, and management on portions of several Special Designated Areas (see Chapter 2.4).

In the range of the California spotted owls, all barred owls located on ongoing or future monitoring, inventory, or survey efforts would be removed as soon as practicable after detection across the range of the subspecies and in forest areas representing the potential invasion pathways into the range. These pathways include the South Cascades, Shasta-Modoc, Eastern Sierra, Sierra-Southern California, and Coastal Invasion Pathways.

Northern spotted owl range

As noted in Section 3.1, for the purpose of this analysis we assume a maximum of 10 percent implementation in the first year, 50 percent in the second year, and full implementation in the third year and beyond. Under this alternative, we estimate a maximum of 2,411 barred owls would be removed during the first year of barred owl management across the range of the northern spotted owl, 11,270 in the second year, and 15,584 annually in years 3 to 30 (Table 3-7). This represents the maximum number of barred owls that would be removed if funding and staffing were to be available. This would represent an average annual removal of approximately 16 percent of the estimated starting population of barred owls in the range of the northern spotted owl and less than one percent of the estimated global barred owl population (15,584/3.5 million = 0.004, equivalent to 0.4 percent).

Alternative 2 would result in the removal of barred owls from up to 28 percent of the northern spotted owl range over the 30 years of the analysis. Thus, barred owls would remain unmanaged on approximately 72 percent of the northern spotted owl range, and barred owl populations would continue to remain stable or increase in these areas. Removal areas would occur distributed across the entire northern spotted owl range. The maximum number of barred owls removed annually under Alternative 2 implementation in the northern spotted owl range would represent removal from less than one percent of the current barred owl range in North America.

This alternative would result in an intermediate impact on the barred owl population in the West, as compared to the other action alternatives. At maximum implementation, removal could occur on 28 percent of the spotted owl range in the West, which could result in significant effects on local barred owl populations within management areas and in some physiographic provinces. However, this level of barred owl removal would not have a significant effect on the global barred owl population because it represents such a small portion of the global barred owl population.

Table 3-7. Alternative 2 – Preferred Alternative – Proposed Strategy Implementation. Percentage of forest lands under barred owl management and estimated number of barred owls removed annually. Based on 10 percent implementation in year 1, 50 percent in year 2, and full implementation in year 3 to 30.

Physiographic Province	Maximum Acres of the Forest Lands Under Barred Owl Management Annually			Maximum Number of Barred Owls Removed, Annual Average		
	Year 1	Year 2	Year 3 to 30	Year 1	Year 2	Year 3 to 30
Olympic Peninsula	63,902	319,5088	639,017	166	781	1,119
Western Washington Cascades	179,125	895,627	1,791,253	466	2,188	3,137
Eastern Washington Cascades	113,065	565,326	1,130,651	138	612	553
Oregon Coast Ranges	156,851	784,255	1,568,510	408	1,916	2,747
Western Oregon Cascades	195,728	978,642	1,957,283	509	2,391	3,428
Eastern Oregon Cascades	71,941	359,703	719,406	88	389	352
Oregon Klamath	96,591	482,953	965,905	221	1,041	1,492
California Coast	114,870	574,351	1,148,702	123	580	832
California Klamath	255,565	1,277,825	2,555,649	275	1,291	1,851
California Cascades	1,976,883	1,976,883	1,976,883	18	80	72
Western Washington Lowlands[1]	0	0	0	0	0	0
TOTAL	3,109,650	7,640,720	13,304,557	2,411	11,270	15,584

[1] Barred owl management in this province is limited to site management if spotted owl sites be found.

California spotted owl range

Under full implementation of Alternative 2, we anticipate barred owls would continue to be detected as they settled and became territorial within the California spotted owl range. Additional monitoring, focused on the northern portion of the Sierra Nevada, the most likely invasion source, would be initiated. This could increase the number of barred owls located and removed. To accommodate this potential increase in removal, we increased the initial estimate of annual removal by 10 percent. Based on the analysis approach described in Section 3.3.1, this would result in the potential removal of approximately 2,550 barred owls over 30 years. Due to increasing rates of invasion, removals would not be evenly distributed over time (Table 3-8).

Table 3-8. Alternative 2 – Preferred Alternative – Proposed Strategy Implementation. The estimated maximum number of barred owls removed by year, and the average annual number of barred owls removed by decade.

California Spotted Owl Population	Maximum Number of Barred Owls Removed per Year in Each Decade			Maximum Cumulative Number of Barred Owls Removed per Decade			Total
	1	2	3	1	2	3	
Sierra Nevada	33	73	112	330	730	1,120	2,180
Coastal-Southern California	6	12	19	60	120	190	370
Total	39	85	131	390	850	1,310	2,550

Alternative 2 would result in the removal of barred owls from the entire range of the California spotted owl. Because the barred owl invasion of this area is still in the early stages, this removal would limit development of barred owl populations. As a result, the actual number removed is relatively low compared to the northern spotted owl range, and intermediate in the California spotted owl range when compared to the other action alternatives. Given the low number of barred owls removed (up to 131 annually and a total of 2,550 over 30 years) in comparison to populations in the West (over 100,000), this Alternative would not have a significant effect on barred owl populations in the West. Alternative 2 implementation in the California spotted owl range would not have a significant effect on barred owl populations range-wide.

3.3.6 Alternative 3 – Management Across the Range

Alternative 3 would allow for barred owl management to be implemented anywhere within the range of the northern or California spotted owls or within 15 miles of the range of the subspecies (Map 2-6) on up to 50 percent of the area. For analysis purposes, we assumed that barred owl management would be distributed evenly across the physiographic provinces for the northern spotted owl range, and assumed the 50 percent would be focused largely on the northern portion of the Sierra Nevada. Because of the small population of barred owls and the focus on removal as soon as individual barred owls are detected, it is unlikely the 50 percent limit would be reached and therefore, all barred owls would be removed.

Northern spotted owl range

As noted in Section 3.1, for the purpose of this analysis we assume a maximum of 10 percent implementation in the first year, 50 percent in the second year, and full implementation in the third year and beyond. Under this alternative at full implementation, a maximum of 4,015 barred owls would be removed during the first year of barred owl management across the range of the northern spotted owl, 12,976 in the second year, and 29,948 in the third and subsequent years (Table 3-9). The 15-mile buffer adds approximately 5,536,958 acres to the potential barred owl management area as compared to the northern spotted owl range, resulting in a 10 percent increase in total area. This represents the maximum number of barred owls that would be removed if funding and staffing were to be available. This would represent an average annual removal of approximately 25 percent of the estimated starting population of barred owls in the

range of the northern spotted owl and less than one percent of the estimated global barred owl population.

Table 3-9. Alternative 3. Percentage of forest lands under barred owl management and estimated number of barred owls removed annually. Based on 10 percent implementation in year 1, 50 percent in year 2, and full implementation in year 3 to 30.

Physiographic Province	Maximum Percent of the Forest Lands Under Barred Owl Management by Decade	Maximum Number of Barred Owls Removed		
		First Year	Second Year	Annual Average Year 3 to 30
Olympic Peninsula	50	354	1,663	2,384
Western Washington Cascades	50	684	3,213	4,606
Eastern Washington Cascades	50	256	1,140	1,030
Oregon Coast Ranges	50	714	3,355	4,810
Western Oregon Cascades	50	852	4,006	5,743
Eastern Oregon Cascades	50	127	565	510
Oregon Klamath	50	415	1,950	2,795
California Coast	50	210	989	1,418
California Klamath	50	297	1,397	2,003
California Cascades	50	18	98	117
TOTAL	50	3,927	18,376	25,416

Alternative 3 would result in the removal of barred owls from up to 50 percent of the northern spotted owl range over the 30 years of the analysis, including a 15-mile buffer area beyond the spotted owl range. Removal areas could occur anywhere within the northern spotted owl range. Thus, barred owls would remain unmanaged on approximately 50 percent of the northern spotted owl range and barred owl populations would continue to remain stable or increase in these areas. Full implementation of this alternative would represent barred owl removal from approximately 1.5 percent of the current range of the barred owl in North America.

This alternative would result in the greatest impact on the barred owl population in the West, as compared to the other action alternatives. At maximum implementation, barred owl removal could occur on 50 percent of the spotted owl range in the West, which could result in significant effects on local barred owl populations within management areas and physiographic provinces. However, this level of removal would not have a significant effect on the global barred owl population because it represents such a small portion of the global barred owl population.

California spotted owl range

Under Alternative 3, we anticipate barred owls would continue to be detected as they settled and became territorial with in the California spotted owl range. The added 15-mile buffer adds approximately 8,278,647 acres to the potential barred owl management area, resulting in a 50 percent increase in total area.

Barred owl management would occur on only 50 percent of the total area. However, given the uneven distribution of barred owls in the California spotted owl range, we assumed that the majority of the barred owl management under this alternative would be focused on the northern Sierra Nevada. Given that only a portion of the area would be under barred owl management, under this alternative, barred owls may establish reproductive populations within the subspecies range. The presence of reproductive barred owls increases the potential rate of invasion of the managed areas, as it reduces the dispersal distance required for invading individuals. To account for this potential increase in invasion, we assumed the number of barred owls that would settle and be removed under barred owl management would increase by 50 percent.

Based on the analysis approach described in Section 3.3.1, this would result in the potential removal of approximately 3,465 barred owls over 30 years. Due to increasing rates of invasion, this would not be evenly distributed in time (Table 3-10).

Table 3-10. Alternative 3. The estimated maximum number of barred owls removed by year, and the average annual number of barred owls removed by decade.

California Spotted Owl Population	Maximum Number of Barred Owls Removed per Year, by Decade			Maximum Number of Barred Owls Removed per Decade			Total
	1	2	3	1	2	3	
Sierra Nevada	45	99	153	450	990	1,530	2,970
Coastal-Southern California	8	16	26	75	165	255	495
Total	53	115	179	525	1,155	1,785	3,465

Alternative 3 would result in the removal of barred owls from 50 percent of the entire range of the California spotted owl and an additional 15-mile buffer area beyond the spotted owl range. Because the barred owl invasion of this area is still in the early stages, this removal would limit development of barred owl populations. Barred owls would remain unmanaged on approximately 50 percent of the range, allowing for the development of populations and an increase in the number of barred owls removed despite the lower acreage under management. As a result, the actual number removed would be higher than removal across the range in Alternative 2. However though higher, this would still be a relatively low number of barred owls removed in comparison to populations in the West. Given the low number of barred owls removed (up to 179 annually and 3,465 over 30 years) in comparison to populations in the West (over 100,000), this Alternative would not have a significant effect on barred owl populations in the West. Alternative 3 implementation in the California spotted owl range would not have a significant effect on global barred owl populations.

3.3.7 Alternative 4 - Limited Management by Province/Population

Alternative 4 would allow for barred owl management to be implemented across 100 percent of the highest priority General Management Area or other mapped area in each province within the range of the northern spotted owl (Map 2-7). In the California spotted owl range, barred owl management would be delayed until detections reached 10 percent of surveys in areas within the Sierra Nevada portion of the California spotted owl range, or 5 percent within the Coastal-Southern California portion of the range.

Northern spotted owl range

As noted in Section 3.1, for the purpose of this analysis we assume a maximum of 10 percent implementation in the first year, 50 percent in the second year, and full implementation in the third year and beyond. Under this alternative, a maximum of 1,853 barred owls would be removed during the first year of barred owl management across the range of the northern spotted owl,9,267 in the second year, and 11,220 in the third and subsequent years (Table 3-11). This represents the maximum number of barred owls that would be removed if funding and staffing were available. This would represent an annual average removal of approximately 11 percent of the estimated starting population of barred owls in the range of the northern spotted owl and less than one percent of the estimated global barred owl population.

Table 3-11. Alternative 4. Percentage of forest lands under barred owl management and estimated number of barred owls removed annually. Based on 10 percent implementation in year 1, 50 percent in year 2, and full implementation in year 3 to 30.

Physiographic Province	Maximum Percent of the Forest Lands Under Barred Owl Management	Maximum Number of Barred Owls Removed		
		First Year	Second Year	Annual Average Year 3 to 30
Olympic Peninsula	44	314	1,474	2,113
Western Washington Cascades	12	170	800	1,147
Eastern Washington Cascades	27	138	616	556
Oregon Coast Ranges	31	448	2,107	3,021
Western Oregon Cascades	23	331	1,555	2,230
Eastern Oregon Cascades	10	83	370	334
Oregon Klamath	36	173	814	1,167
California Coast	19	73	343	492
California Klamath	23	97	456	654
California Cascades	13	18	98	117
TOTAL	21	1,845	8,633	11,831

Alternative 4 would result in the removal of barred owls from up to 24 percent of the northern spotted owl range over the 30 years of the analysis. Barred owl removal areas would occur distributed across the entire northern spotted owl range. Thus, barred owls would remain unmanaged on approximately 76 percent of the northern spotted owl range and barred owl populations would continue to remain stable or increase in these areas. The largest percentage of forest under barred owl management would be in the Olympic Peninsula, at 44 percent, leaving 56 percent of the forest land in this province unmanaged. Full implementation of this alternative would represent barred owl removal from less than 0.6 percent of the current barred owl range in North America.

This alternative would result in a relatively low impact on the barred owl population in the West, as compared to the other action alternatives. At maximum implementation, barred owl removal could occur on 24 percent of the spotted owl range in the West, which could result in significant

effects on local barred owl populations within management areas and in some physiographic provinces. However, this level of removal would not have a significant effect on the global barred owl population because it represents such a small portion of the global barred owl population.

California spotted owl range

Under Alternative 4, barred owl management in the Sierra Nevada would be delayed until barred owl detections reached 10 percent in local areas and 5 percent within the Coastal-Southern California portion of the province. This not only increases the barred owl population in the area, but young produced in these areas would likely move into neighboring areas, leading to the establishment of new barred owl populations that themselves reach the threshold for removal. This alternative could lead to a cascade of barred owl population creation and removal, with increasing numbers of local barred owl populations reaching the threshold level over time.

Based on barred owl removal research, in recently invaded areas, we anticipate that once barred owl management commences, 95 percent of the territorial barred owls can be removed each year, and that over two years, the majority of the established barred owl populations would be removed. While removal would be episodic under this approach, it would likely result in a larger total number of barred owls removed per land area. Invading barred owls that would have been removed under steady removal pressure in the preferred alternative would remain until their populations reached the threshold and developed into reproducing populations. Young produced within the barred owl population would add to the population's growth.

Barred owl populations have a high potential growth rate, as demonstrated by an increase in barred owl occupancy by a factor of 2.6 over one year in a northern Sierra Nevada population that was close to the 10 percent detection threshold we apply in this alternative (Wood et al. 2020, p. 4). Therefore, by allowing barred owl populations to establish and grow would result in an increase in barred owls. While removal of barred owls would be episodic under this approach, it could result in a large total number of barred owls removed per land area. To account for the increase in barred owl population under this alternative, we multiplied the number of barred owls remove each year by a factor of 2.5. Therefore, we have a starting removal of 75 barred owls per year during removal.

Based on the analysis approach described in Section 3.3.1, this would result in the potential removal of approximately 10,237 barred owls over 30 years. Due to increasing rates of invasion, this is not evenly distributed (Table 3-12).

Table 3-12. Alternative 4. The estimated maximum number of barred owls removed by year, and the average annual number of barred owls removed by decade.

California Spotted Owl Population	Maximum Number of Barred Owls Removed per Year, by Decade			Maximum Number of Barred Owls Removed per Decade			Total
	1	2	3	1	2	3	
Sierra Nevada	75	165	638	750	1,650	6,375	8,775
Coastal-Southern California	12	28	106	125	275	1,062	1,462
Total	87	193	744	875	1,925	7,437	10,237

Alternative 4 would result in the removal of barred owls across the full range of the California spotted owl once threshold levels of barred owls are reached. While the total area under barred owl management would be similar to Alternative 2, by delaying and allowing self-sustaining barred owl populations to establish, this alternative would result in the highest number of barred owls removed. However, though higher, this would still be a relatively low number of barred owls removed in comparison to populations in the West. Given the relatively low number of barred owls removed (up to 744 annually and a total of 10,237 over 30 years) in comparison to populations in the West (over 100,000), this alternative would not have a significant effect on barred owl populations in the West. Alternative 4 implementation in the California spotted owl range would not have a significant effect on global barred owl populations.

3.3.8 Alternative 5 – Management Focused on Highest Risk Areas

Alternative 5 would focus barred owl management only in the northern portion of the northern spotted owl range, where the subspecies is at greatest risk of extirpation from barred owl competition. Barred owl management could be conducted on 100 percent of two GMAs in the Eastern Washington Cascades, Western Washington Cascades, Eastern Oregon Cascades, Western Oregon Cascades, and Oregon Coast Ranges Physiographic Provinces and one GMA in the Olympic Peninsula Physiographic Province. In the California spotted owl range, under this alternative, barred owl management would be limited to the northern Sierra Nevada portion of the subspecies range.

Northern spotted owl range

As noted in Section 3.1, for the purpose of this analysis we assume a maximum of 10 percent implementation in the first year, 50 percent in the second year, and full implementation in the third year and beyond. Under this alternative at full implementation, a maximum of 2,412 barred owls would be removed during the first year of barred owl management across the range of the northern spotted owl, 12,060 in the second year, and 15,549 in the third and subsequent years (Table 3-13). This represents the maximum number of barred owls that would be removed if funding and staffing were available. This would represent approximately 15 percent of the estimated starting population of barred owls in the range of the northern spotted owl and less than one percent of the estimated global barred owl population.

Table 3-13. Alternative 5. Percentage of forest lands under barred owl management and estimated number of barred owls removed annually. Based on 10 percent implementation in year 1, 50 percent in year 2, and full implementation in year 3 to 30.

Physiographic Province	Maximum Percent of the Forest Lands Under Barred Owl Management by Decade	Maximum Number of Barred Owls Removed		
		First Year	Second Year	Annual Average Year 3 to 30
Olympic Peninsula	44	314	1,474	2,113
Western Washington Cascades	33	457	2,146	3,077
Eastern Washington Cascades	38	193	861	777
Oregon Coast Ranges	52	738	3,467	4,971
Western Oregon Cascades	35	599	2,815	4,035
Eastern Oregon Cascades	50	126	561	507
Oregon Klamath	0	0	0	0
California Coast	0	0	0	0
California Klamath	0	0	0	0
California Cascades	0	0	0	0
TOTAL	23	2,427	11,324	15,480

Alternative 5 would result in the removal of barred owls from up to 26 percent of the northern spotted owl range over the 30 years of the analysis, focused on the northern portion of the range. The area under barred owl removal by province would vary from 33 to 52 percent. The largest percentage of forest under barred owl management would be in the Oregon Coast Ranges, at 52 percent, leaving 48 percent of the forest land in this province unmanaged. Thus, barred owls would remain unmanaged on approximately 74 percent of the northern spotted owl range, with a strong focus on the southern provinces. However, even in the northern province with the greatest intensity of barred owl removal, 48 percent of the area would have no barred owl removal. Barred owl populations would continue to remain stable or increase in these areas. Full implementation of this alternative would represent barred owl removal from approximately 0.7 percent of the current barred owl range in North America.

This alternative would result in an intermediate impact on the barred owl population in the West, as compared to the other action alternatives. At maximum implementation, barred owl removal could occur on 26 percent of the spotted owl range in the West and limited to the northern portion of the range. This could result in significant effects on local barred owl populations within management areas and in the northern physiographic provinces. However, this level of barred owl removal would not have a significant effect on the global barred owl population because it represents such a small portion of the global barred owl population.

California spotted owl range

Under Alternative 5, we anticipate barred owls would continue to be detected as they settle and become territorial within the northern Sierra Nevada. Additional monitoring, focused on the northern portion of the Sierra Nevada, the most likely invasion source, would be initiated. Removals would be limited to the northern Sierra Nevada.

The barred owl invasion and removal is not evenly distributed across the Sierra Nevada. The northern Sierra Nevada, being closer to the source barred owl population in the northern spotted owl range, is likely to continue to receive the bulk of the invading barred owls. This was the location of the first barred owl population detected in the California spotted owl range, and we anticipate this could occur again. A barred owl removal experiment conducted in the Sierra Nevada between 2018 and 2020 resulted in the removal of 76 barred owls, of which 65 (85 percent) were removed in the northern area (Hofstadter et al. 2022, p. 281). Therefore, under this alternative, we assumed barred owl removal levels at 85% of those from Alternative 2, where management occurred across the Sierra Nevada.

Based on the analysis approach described in Section 3.3.1, this would result in the potential removal of approximately 1,684 barred owls over 30 years (Table 3-14).

Table 3-14. Alternative 5. The estimated maximum number of barred owls removed by year, and the average annual number of barred owls removed by decade.

California Spotted Owl Population	Maximum Number of Barred Owls Removed per Year, by Decade			Maximum Number of Barred Owls Removed per Decade			Total
	1	2	3	1	2	3	
Sierra Nevada	26	56	87	256	561	867	1,684

Alternative 5 would limit the removal of barred owls to the Sierra Nevada portion of the range of the California spotted owl. This alternative would have the lowest acreage under management, and result in the lowest number of barred owls removed. However, in doing so this would allow for barred owl populations to become established in portions of the Sierra Nevada and in the Coastal-Southern California portion of the California spotted owl range. Given the low number of barred owls removed (up to 87 annually and a total of 1,684 over 30 years) in comparison to barred owl populations in the West (over 100,000), this Alternative would not have a significant effect on barred owl populations in the West. Alternative 5 implementation in the California spotted owl range would not have a significant effect on global barred owl populations.

3.3.9 Alternative 6 - Management Focused on Best Conditions

Alternative 6 would focus barred owl management in the southern portion of the northern spotted owl range, where spotted owl populations have not decreased to the degree they have in the north. Barred owl management could occur on up to 75 percent of each GMA in the Oregon Klamath, California Coast, California Klamath, and California Cascades provinces. In the California spotted owl range, under this alternative, barred owl management would be focused on areas with the best remaining spotted owl habitat and areas with higher fire resiliency, including 50 percent of the Sierra Nevada portion of the range with the best remaining habitat, and the 75 percent of the Coastal-Southern California portion of the range.

Northern spotted owl range

As noted in Section 3.1, for the purpose of this analysis we assume a maximum of 10 percent implementation in the first year, 50 percent in the second year, and full implementation in the

third year and beyond. Under this alternative at full implementation, a maximum of 1,035 barred owls would be removed during the first year of barred owl management across the range of the northern spotted owl, 5,117 in the second year, and 6,748 in the third and subsequent years (Table 3-15). This represents the maximum number of barred owls removed if funding and staffing were to be available. This would represent an average annual removal of approximately seven percent of the estimated starting population of barred owls in the range of the northern spotted owl and less than one percent of the estimated global barred owl population.

Table 3-15. Alternative 6. Percentage of forest lands under barred owl management, the number of barred owls removed the first year, and the average annual number of barred owls removed by decade.

Physiographic Province	Maximum Percent of the Forest Lands Under Barred Owl Management by Decade	Maximum Number of Barred Owls Removed		
		First Year	Second Year	Annual Average Year 3 to 30
Olympic Peninsula	0	0	0	0
Western Washington Cascades	0	0	0	0
Eastern Washington Cascades	0	0	0	0
Oregon Coast Ranges	0	0	0	0
Western Oregon Cascades	0	0	0	0
Eastern Oregon Cascades	0	0	0	0
Oregon Klamath	40	332	15,61	2,238
California Coast	44	185	870	1,248
California Klamath	69	412	1,937	2,777
California Cascades	65	18	98	117
TOTAL	18	947	2,905	6,380

Alternative 6 would result in the removal of barred owls from up to 17 percent of the northern spotted owl range over the 30 years of the analysis, focused on the southern portion of the range. The area under barred owl removal by province would vary from 40 to 68 percent of the individual provinces. Thus, barred owls would remain unmanaged on approximately 83 percent of the northern spotted owl range, with a strong focus on the northern provinces. However, even in the southern province with the greatest intensity of barred owl removal, 32 percent of the area would have no barred owl removal. Barred owl populations would continue to remain stable or increase in these areas. Full implementation of this alternative would represent barred owl removal from approximately 0.5 percent of the of the current barred owl range in North America.

This alternative would result in the lowest impact on the barred owl population in the West, as compared to the other action alternatives. At maximum implementation, barred owl removal could occur on 17 percent of the spotted owl range in the West and is limited to the southern physiographic provinces where barred owl populations are the lowest in the northern spotted owl range. This could result in significant effects on local barred owl populations within management areas and in the southern physiographic provinces. However, this level of removal would not have a significant effect on the global barred owl population because it represents such a small portion of the global barred owl population.

California spotted owl range

Under Alternative 6, barred owl management would occur on 50 percent of the Sierra Nevada portion of the California spotted owl range and the 75 percent of the Coastal-Southern California portion of the range. This would leave 25 to 50 percent of the range unmanaged, where barred owls could establish populations. As in Alternative 3, we anticipate that the presence of reproductive barred owls would increase the potential rate of invasion of the managed areas because the presence of nearby breeding barred owls reduces the dispersal distance required for invading individuals. To account for this potential increase in invasion, we anticipate an increase in the number of barred owls that would settle and be removed under management by 50 percent in the Sierra Nevada and 25 percent in Coastal-Southern California portions of the range. Based on the analysis approach described in Section 3.3.1, this would result in the potential removal of approximately 3,380 barred owls over 30 years (Table 3-16).

Table 3-16. Alternative 6. The estimated maximum number of barred owls removed by year, and the **average annual number of barred owls removed by decade.**

California Spotted Owl Population	Maximum Number of Barred Owls Removed per Year, by Decade			Maximum Number of Barred Owls Removed per Decade			Total
	1	2	3	1	2	3	
Sierra Nevada	45	99	153	450	990	1,530	2,970
Coastal-Southern California	6	14	21	60	140	210	410
Total	51	113	174	510	1130	1,740	3,380

Alternative 6 would limit the removal of barred owls to 50 percent of the Sierra Nevada portion of the range of the California spotted owl and 75 percent of the Coastal-Southern California portion of the range. This alternative would have the lowest acreage under barred owl management and would result in an intermediate number of barred owls removed as compared to the other action alternatives. However, in doing so this would allow for barred owl populations to become established in portions of the Sierra Nevada and in the Coastal-Southern California portion of the California spotted owl range. Given the relatively low number of barred owls removed (up to 174 annually, and 3,380 over 30 years) in comparison to barred owl populations in the West (approximately 100,000), this alternative would not have a significant effect on barred owl populations in the West. Alternative 6 implementation in the California spotted owl range would not have a significant effect on global barred owl populations.

3.3.10. Summary of effects of the alternatives on barred owls

Alternative 1 – no action, would have no significant effect on barred owl populations. All the action alternatives would have some level of adverse effect on barred owls through the removal of barred owls from management areas, which is consistent with the purpose and need for the action.

In the northern spotted owl range, Alternative 3 would have the greatest adverse impact on barred owl populations due to the large area under removal activities. Alternative 6 would have the lowest adverse effect because barred owl removal would be focused on the southern portion

of the northern spotted owl range, which has the lowest density of barred owls at this time, resulting in fewer barred owls being removed per area. This alternative would result in no removal in the northern two-thirds of the northern spotted owl range and would have no significant effect on barred owls in those areas. Both Alternatives 5 and 6 would leave large areas of the northern spotted owl range without barred owl management. Full implementation of any action alternative would have significant effects on barred owl populations within management areas, and in some physiographic provinces, though barred owls would not be eliminated in any physiographic province with the potential exception of the California Cascades province. There would be no significant effect on global barred owl populations under any of the action alternatives.

In the California spotted owl range, Alternative 4 would result in the most barred owls removed but would also allow for the establishment of barred owl populations. The increase in barred owls would result in more barred owls being removed once management intervention begins. Alternative 5 would result in the lowest number of barred owls removed due to the limitation of removal to a portion of the northern Sierra Nevada area. However, outside of this area, barred owls would potentially establish populations and could offset the effect of removals in the north (Table 3-17). Because barred owl populations are not well established in the California spotted owl range, barred owl removals focused on preventing establishment would not have a significant effect on regional or global barred owl populations.

Table 3-17. Comparison of effects of the alternatives on barred owls.

Effect	Alternative 1 – No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Northern Spotted Owl Range						
Percent of the forest managed	0	31	50	21	23	18
Number of barred owls removed in year 1	0	2,411	3,927	1,846	2,426	947
Average annual number of barred owls removed year 3 to 30	0	15,584	25,417	11,831	15,480	6,380
Distribution of barred owl management across the northern spotted owl range	None	Entire	Entire plus buffer	Entire	North only	South only

Effect	Alternative 1 – No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
California Spotted Owl Range						
Maximum number of barred owls removed total	0	2,550	3,465	10,237	1,684	3,380
Percentage of Range under management	0	100	50 plus buffer	100	56	50-75
Distribution of barred owl management across the California spotted owl range	None	Entire	Entire plus buffer	Entire	Sierra Nevada only	Entire

3.4 Northern and California Spotted Owls

Our discussion of the effects of the management of barred owls on spotted owls is, as for other sections, focused on the range of the northern and California spotted owls where barred owls also occur, and adjacent areas described for management. For each alternative we describe the anticipated effects to spotted owls, including the overall effects to northern and California spotted owl populations at the provincial, regional, and range-wide scales.

3.4.0 Changes between Draft and Final EIS

- Updated the data tables based on the latest spotted owl habitat data (2024) and revisions to the alternatives described in Chapter 2.

3.4.1 Background and Analytical Methods

As a result of differences in the available data and condition of northern and California owl populations, we used a different analysis approach for each species.

Northern spotted owl

To estimate the current population of spotted owls in each province, we used an estimate of the carrying capacity for spotted owls based on the habitat condition within the province, and the occupancy of potential sites based on the occupancy levels from the long-term demographic studies. For the purpose of the carrying capacity analysis below, northern spotted owl habitat condition was represented by the 2024 Northern Spotted Owl Habitat GIS layer (Davis et al.

2024b). This mapping of habitat uses methods described by Glenn et al. (2017, entire) to identify areas that could support territorial northern spotted owl pairs, based on the amount of nearby nesting and roosting forest cover (as represented by the 2024 Cover Type Suitability GIS layer (Davis et al. 2024a)), topographic position, and other landscape features (see Davis et al. 2022, pp. 10-12, for more information). The occupancy levels were analyzed as of 2018, and we extrapolated the results to 2023 (Yakulic pers. comm. 2023). These data are focused on pair occupancy. The results are shown in Table 3-18 and represent the starting spotted owl population for estimates of the effects of the alternatives.

Table 3-18. Estimated number of spotted owl pairs by province in 2024.

Physiographic Province	Estimated Average Carrying Capacity - Pairs	Estimated Percent of Sites Occupied by Spotted Owl Pairs	Estimated Number of Spotted Owl Pairs
Olympic Peninsula	554	7	41
Western Washington Cascades	1,073	6	66
Eastern Washington Cascades	484	4	19
Oregon Coast Ranges	1,777	9	160
Western Oregon Cascades	1,897	19	367
Eastern Oregon Cascades	415	17	69
Oregon Klamath	1,989	13	261
California Coast	5,469	29	1,587
California Klamath	2,931	32	938
California Cascades	389	17	65
TOTAL			3,573

To estimate the northern spotted owl population trend in the absence of barred owl management, we used the above starting populations and extrapolated the 5.3 percent annual spotted owl population decline over the 30 years of the analysis based on the most recent population trend data from the spotted owl demography analysis (Franklin et al. 2021, entire). This was applied to Alternative 1 – no action and the unmanaged portions of the action alternatives.

Under the action alternatives, barred owl management would reduce barred owl populations in at least some areas, thereby creating areas with significantly lower barred owl populations and creating some barred-owl free forested areas. As habitat with reduced barred owl populations became available, we anticipate that spotted owls would recolonize some of these sites. Although the data are limited, past removal experiments demonstrate such recolonization. Therefore, the Service considers the weight of evidence sufficient to assume this would occur at some level on a range-wide scale.

The first barred owl removal experiment in the northern spotted owl range occurred on Green Diamond lands in northern California from 2009 through 2013 (Diller et al. 2016, entire). At the time, this study area was at the front of the barred owl invasion. Following barred owl removal, the spotted owl population trend on these lands changed from declining to increasing on the treatment area where barred owls were removed, while continuing to decline on the control area

where barred owls were not removed. This included the reoccupancy of seven sites from which spotted owls had been excluded by barred owls, four of which were reoccupied by the original resident spotted owls. Removal studies in the Sierra Nevada in 2018 through 2020 also found substantial response from California spotted owls, with spotted owls recolonizing 56 percent of the formerly occupied territories within one year (Hofstadter et al. 2022, p. 282). This was also early in the invasion process.

The Barred Owl Removal Experiment, conducted on four study areas in Washington, Oregon, and northern California, provides insight into the response to barred owl removal in areas with a longer history and higher density of barred owl populations. Barred owl removal occurred between 2013 and 2020, with between four and eight years of removal depending on the study areas. Removal of barred owls had a strong, positive effect on survival of sympatric spotted owls and a weaker, though still positive effect on spotted owl dispersal and recruitment. The estimated mean annual rate of population change for spotted owls stabilized in areas with removals (0.2% decline per year), but continued to decline sharply in areas without removals (12.1% decline per year) (Wiens et al. 2021, p. 5).

Barred owl removal studies on the Hoopa Reservation started in 2013 as part of the Barred Owl Removal Experiment and continued through 2023, representing the longest running barred owl removal study. Over the 10 years, an increase in apparent survival and a stabilization of recruitment resulted in a gradual increase in the number of confirmed pairs of spotted owls at Hoopa (Higley 2023, p. 9). Immediately after initiation of barred owl removal, apparent survival of spotted owls quickly rebounded to pre-barred owl levels. The spotted owl population trend quickly reached near-stability (Higley 2023, p. 36), and the minimum known survival of juveniles has also rebounded to earlier levels, following several years (2010-2013) when it was zero (Higley 2022, p. 14)

Based on the above results, we developed the following approach to analyzing the potential response of northern spotted owls to barred owl removal on management areas.

In areas where the barred owl invasion is just beginning, and barred owls have not affected spotted owl populations to a detectable level, no change in past spotted owl trends is anticipated on areas under barred owl management. Areas outside of barred owl management areas would begin or intensify declines as barred owl populations increase. For the northern spotted owl range, the area where the barred owl invasion is in its initial phase is limited to Marin and Sonoma Counties and the California Cascades province. This applies across the California spotted owl range.

In areas where spotted owl declines related to barred owl competition are documented but are relatively recent occurrences, we would expect an effect of barred owl removal similar to those observed in the Green Diamond (Diller et al. 2016, entire) and Sierra Nevada (Hofstadter et al. 2022, entire) studies. With barred owl removal, we would anticipate a strong immediate response from spotted owls and continuation of this response until the remaining displaced spotted owls resettle. This would be followed by a slower spotted owl population increase driven by reproduction, and colonization by the young produced, until carrying capacity was reached. Unfortunately, areas where we would anticipate this response represent a relatively small portion

of the northern spotted owl range. Based on the Green Diamond results, we would anticipate a three percent increase in the spotted owl population on management areas once the remaining displaced spotted owls had resettled, until the population reached 80 percent of full occupancy (Diller et al 2016, p. 12).

In the majority of the range of the northern spotted owl, where barred owl populations have been well established for many years, we would anticipate a slower spotted owl population response to barred owl management. This would be due to a lack of displaced adults to return to cleared sites due to natural mortality, and the small spotted owl population available to produce young. Based on past research results, we considered potential spotted owl population estimates based on population "growth" rate of -0.2 percent, +0.5 percent, and +1 percent annually. The first rate (-0.2 percent) represents the spotted owl population trend on study areas in the Barred Owl Removal Experiment after 3 years of barred owl removal (Wiens et al. 2021, p. 5). This is a substantial improvement on the current rate of spotted owl population decline, but represents a slowly declining population. The Green Diamond study showed a spotted owl population trend of +3 percent rate of change (Diller et al 2016, p. 12). However, this is from an area in the early stages of barred owl invasion, which is not the condition in most of the northern spotted owl range. Diller et al. (2016, p. 15) noted this, and suggested that where barred owls have been present for longer periods and spotted owl populations are lower, the spotted owl population response to barred owl removal may be slower or delayed. As a result, we considered estimated growth rates of +0.5 percent and +1 percent. The second and third options represent such a range of potential positive growth rates. Note that for very small populations, stochastic and random events and the fortunes of the remaining individuals are more likely to affect population trend, which could result in more rapid growth, sudden extirpation, or anything in between.

For analysis of the effects of the alternatives on spotted owls, we chose a spotted owl population change estimate of an annual increase of 0.5 percent. We chose this model of future population growth because it illustrates a reasonable rate of population change that allows for comparison between alternatives and falls within the range of growth rates identified in removal studies (i.e., between -0.2 percent and 3 percent; see above). We caution against using it for other purposes, because spotted owl population models designed for other purposes would focus on other factors that could affect the population growth rates, which are not accounted for here.

We made all calculations using the estimated starting spotted owl population in each province described above and projecting the population trend over the 30 years of the analysis with a 0.5 percent increase in spotted owl populations within barred owl management areas, and the spotted owl population rate of change from the most similar spotted owl demographic area for the unmanaged areas (See Table 3-22). In doing this, we assumed 10 percent implementation in year 1, 50 percent implementation in year 2, and the maximum level of barred owl management under the alternative from year 3 to 30, allowing for comparison between alternatives. For the analysis, we used the acres of suitable spotted owl habitat within the management areas of each province to estimate the percentage of the spotted owl population that would be managed (Table 3-19). Suitable northern spotted owl habitat described in this document includes lands with suitable and highly-suitable nesting and roosting forest cover types as defined in Davis et al. (2022, pp. 8-9), and we used the most recent modeled layer of that suitable habitat, the 2024 Cover Type Suitability GIS layer (Davis et al. 2024a). We used this defined suitable habitat to calculate the

starting spotted owl population within the barred owl management areas of a province under each alternative.

Table 3-19. Acres of land and suitable spotted owl habitat by province.

Physiographic Province	Total Acres	Spotted Owl Suitable Habitat Acres
Olympic Peninsula	3,034,555	847,671
Western Washington Cascades	6,154,074	1,592,735
Eastern Washington Cascades	5,691,079	730,198
Oregon Coast Range Expanded	7,300,442	854,139
Western Oregon Cascades Expanded	7,840,544	2,266,430
Eastern Oregon Cascades	2,382,593	317,326
Oregon Klamath	4,003,341	1,287,732
California Coast	5,694,290	1,145,692
California Klamath	6,089,224	1,566,458
California Cascades	2,500,969	295,062
Western Washington Lowlands	6,515,511	129,531
TOTAL	54,584,639	11,032,974

California spotted owl

As with the northern spotted owl, in areas where the barred owl invasion is just beginning, and barred owls have not affected spotted owl populations to a detectable level, no change in past spotted owl trends is anticipated on areas under barred owl management. This applies across the California spotted owl range. However, in areas outside of management areas, we anticipate that impacts on spotted owls would occur as barred owl population increase.

Because barred owls have not demonstrably impacted California spotted owl populations to date, with the exception of the northern Sierra Nevada population where barred owls were experimentally removed, we do not have data to estimate population trends with and without barred owl management. Therefore, the analysis for California spotted owls is qualitative and based on area managed for barred owls.

3.4.2 Affected Environment

As described in Chapter 1, northern spotted owls were listed as threatened in 1990. By 2004, the Service had identified competition from barred owls as a primary threat to northern spotted owl populations (USFWS 2004, p. 43). The 2011 Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, p. III-65) recommended that we manage to reduce the negative effects of barred owls on northern spotted owls (Recovery Action 30). In 2020, the Service determined that the northern spotted owl was warranted for reclassification as an endangered species (85 FR 81144).

Competition from barred owls has been widely identified as a primary cause of the continuing decline of northern spotted owls. Based on the recent demographic analysis, northern spotted owl

populations in the northern half of the species' range have dropped by over 75 percent in two decades and spotted owl populations continue to decline across their range (Franklin et al. 2021, pp. 11-13). Without management of barred owls, extirpation of northern spotted owls from major portions of their historical range is likely in the near future (Franklin et al. 2021 p. 19; Hofstadter 2022, p. 278).

Barred owls have recently invaded the range of the California spotted owl. While their numbers are currently low, they are considered to be a threat affecting the current condition of California spotted owl populations in the northern Sierra Nevada, and they pose a significant risk in the future. In 2023, the Service proposed listing California spotted owl as threatened in the Sierra Nevada distinct population segment and endangered in the Coastal-Southern California distinct population segment. As part of this analysis, the Service concluded ". . . barred owls are a significant threat to the persistence of California spotted owls, and we expect the magnitude of the threat to increase into the foreseeable future, particularly if [barred owl] management efforts are not continued" (88 FR 116000 at 11619).

Given the different condition of northern and California spotted owls, we address the condition of each separately in the background and within the analysis of the effects of each alternative, as appropriate.

Northern spotted owls

Spotted owls are a species that is adapted to relatively stable environments with stable carrying capacities, and as such experience naturally slow population growth. They are slow to reproduce, with generally less than two young per breeding attempt; they do not breed every year; and young spotted owls have a very low survival rate during their first year.

The carrying capacity of forests within the range of the species has declined significantly over time due to the loss of habitat to human caused and natural events such as large wildfires. Most recently, competition from barred owls has further limited the availability of habitat for spotted owls in the northern spotted owl range and threatens to do so in the California spotted owl range.

California spotted owls

California spotted owls are currently found throughout their known historical range, although there is evidence of a decrease in abundance in parts of the range including both the Sierra Nevada and Coastal-Southern California.

Spotted owl population growth is variable throughout study areas in the Sierra Nevada population where data are available, with documented declines ranging from 31 to 50 percent in some study areas and increases of 25 percent in another. The only available demographic data for the Coastal-Southern California spotted owl population is from the San Bernardino National Forest (88 FR 11600 at 11611). A population decline of 9 percent was observed from 1987 to 1998 in this area, with more recent occupancy analyses showing further declines in population size and documented accelerating declines over the last 30 years, even though this is the study area that historically contained the largest number of California spotted owls. While barred owls

have not reached this area and are not the cause of this decline, they would exacerbate this decline by adding additional stressors should they become established.

Barred owls have not demonstrably impacted California spotted owl populations to date, with the exception of the northern Sierra Nevada population. Barred owls were successfully removed from this population under a removal experiment. We do not have data to estimate California spotted owl population trends with and without barred owl management, as we do for northern spotted owls. Therefore, the analysis for California spotted owls is qualitative and based on the area managed.

3.4.3 Environmental Consequences

The following sections present the potential environmental effects of the no action alternative, proposed action, and alternatives on spotted owl populations. Methodologies and underlying data vary between the northern and California spotted owl ranges, therefore we address these separately for each of the action alternatives.

3.4.4 Alternative 1 – No Action

Under the no action alternative, no systematic barred owl management strategy would be finalized or implemented, and the Service would not obtain a permit for comprehensive management of barred owls. Barred owls would continue to expand within the northern spotted owl range, further impacting spotted owl populations, and would invade the California spotted owl range. The impact of barred owls on northern and California spotted owls is substantially different at this time, due to the history and timing of the invasion. We have substantial data from the northern spotted owl range that allows us to estimate the potential population response of spotted owls. Our analysis for the California spotted owl range is qualitative (Table 3-20).

Northern spotted owls

The following represents the impact of no action on spotted owl populations over the 30 years of the analysis.

As displayed in Table 3-20, in the absence of barred owl management, the northern spotted owl would likely be extirpated from major portions of its range. Estimated spotted owl populations below 10 pairs could be considered functionally extirpated. Spotted owl populations below 20 pairs in an area as large as a province are at high risk of near-term extirpation. Only 2 of the 10 provinces would be left with more than 100 pairs following 30 years. Without management of barred owls, extirpation of northern spotted owls from major portions of their historical range would be likely in the near future, resulting in significant adverse impacts to the northern spotted owl. This concern has been echoed by numerous authors, including Franklin et al. 2021 (p. 19).

Table 3-20. Estimate of spotted owl population trend over 30 years under the no action alternative, based on population trends calculated for the northern spotted owl demography analysis.

Physiographic Province	Study Area Used for Rate of Change	Average Rate of Population Change, from Demography Studies	Estimated Number of Pairs	Number of Remaining Spotted Owl Pairs at Year		
				10	20	30
Olympic Peninsula	Olympic Peninsula	0.917	41	17	7	3
Western Washington Cascades	Rainier	0.943	66	37	20	11
Eastern Washington Cascades	Cle Elum	0.916	19	8	3	1
Oregon Coast Ranges	OR Coast Ranges	0.926	160	75	35	16
Western Oregon Cascades	H.J. Andrews	0.955	367	231	146	92
Eastern Oregon Cascades	Cascades	0.953	69	43	26	16
Oregon Klamath	Klamath	0.935	261	133	68	35
California Coast	Green Diamond Resources	0.947	1,587	921	534	310
California Klamath	NW California	0.971	938	698	520	387
California Cascades	Cascades	0.953	65	40	25	15
Western Washington Lowlands	Olympic Peninsula	0.917	0	0	0	0
TOTAL			3,573	2,203	1,384	886

California spotted owls

Under the no action alternative, barred owls would continue to invade the range of the California spotted owl. Barred owl detections in the subspecies' range have continued to increase, though some of these have been removed as part of ongoing studies. Numbers of barred owls are currently relatively low in the Sierra Nevada, and none have been documented in the Coastal-Southern California portion of the subspecies' range. However, based on the history of invasion in the range of the northern spotted owl, where initial slow barred owl population growth was followed by rapid growth once barred owl populations reached a critical mass, we anticipate that the increase in barred owls would accelerate if barred owls were allowed to establish breeding populations. Once this happened, we anticipate that barred owls would displace California spotted owls and cause or exacerbate spotted owl population declines. Therefore, barred owls are a significant threat to the persistence of California spotted owls, and we expect the magnitude of the threat would increase into the foreseeable future under the no action alternative.

3.4.5 Common to all action alternatives

All action alternatives include the removal of barred owls from various management areas within the range of the northern spotted owl, and in all, or portions of, the California spotted owl range. Removal of barred owls from management areas would have a significant positive effect on spotted owls within the management areas. Removal of barred owls was shown to have a strong, positive effect on survival of northern spotted owls and a weaker, though still positive, effect on northern spotted owl dispersal and recruitment, resulting in relative stability of spotted owl populations (Wiens et al. 2021, entire). In northern California, barred owl removal resulted in an increasing spotted owl population trend (Diller et al. 2016, entire). In both studies spotted owl populations continued to decline on neighboring areas without barred owl removal. Therefore, all actions alternatives would result in significant beneficial effects for northern spotted owl to varying degrees.

Removal of barred owls from a recently established population in the California spotted owl range resulted in recolonization of 56 percent of the formerly occupied territories by spotted owls within one year. Thus, all action alternatives will have a significant beneficial effect on California spotted owls by reduce threats to the subspecies by varying degrees.

We also evaluated the potential for negative effects of barred owl removal methods on spotted owls. Barred owl removal involves the presence of one to three individuals (removal specialists and observers or surveyors), the broadcast of barred owl territorial calls, and one to three discharges of a shotgun at a location adjacent to or within forested areas, spread across the landscape and separated in time.

The presence of small crews along roads and trails is a common occurrence and the removal efforts would not represent a substantial increase in such activity. Barred owls call frequently. The additional of broadcasts to attract barred owls would not substantially change the soundscape for spotted owls. Neither of these activities are likely to negatively affect spotted owls under any action alternative.

Even when they are nesting, spotted owls are not overly sensitive to the short duration, sharp, and occasional noise of the type created by the firing of shotguns for barred owl removal. To further reduce the potential for disturbing nesting spotted owls, removal would generally not occur within 300 yards of a known active spotted owl nest during the critical breeding period for northern spotted owls (March 1 to July 31, or as established locally). If spotted owls were detected in the immediate vicinity of barred owls, removal efforts for the barred owls would generally be postponed to a later date unless the barred owl could be “pulled” at least one-half mile away from the spotted owls. Spotted owls respond to barred owl calls in some cases, so we anticipate that spotted owls nesting near a potential barred owl removal location may respond, thereby triggering the requirement to avoid the spotted owls. Both of these markedly reduce the potential for barred owl removal to occur near spotted owl nests.

The limited duration of the noise (one to three shotgun discharges), widely scattered over time and space, coupled with the strong attenuation of sound over distance in the forest stand, lead us to conclude that any disturbance of spotted owls from barred owl removal would be very

short term and highly unlikely to affect spotted owl survival and reproduction, even where it inadvertently occurs close to an active nest. Therefore, we do not anticipate likely negative effects of the physical act of barred owl removal, presence of crews, or sound of gunshots on spotted owls through disturbance under any of the action alternatives.

The removal protocol (Appendix 2) used for lethal removal in all action alternatives includes specific elements to eliminate the potential for the accidental injury or death of spotted owls during barred owl removal. The training requirements ensure that removal specialists have the ability to accurately identify barred owls using auditory and visual characteristics. Removal of hybrid spotted/barred owls has additional requirements to ensure spotted owls are not misidentified.

Spotted owls may respond to barred owl calls or may be in the area of the removal. When this occurs, removal specialists are required to stop the removal effort and attempt to draw the barred owl away from the spotted owl. Where spotted owl nest sites are known, removal is limited to 300 yards or more from the active site during the critical breeding season. Juvenile spotted and barred owls appear very similar until they acquire adult plumage. Juvenile owls may only be removed when they can be positively identified as to species by plumage or by the presence and attendance of the parents.

This protocol has been used in several experiments involving barred owl removal. Over 4,500 barred owls have been removed to date without a single injury or death of any non-target species, including spotted owls. Based on the protective features of the barred owl removal protocol and the experience with its use, the potential for accidental injury or death of a spotted owl during individual barred owl removals is extremely low. However, at maximum implementation, given the large scale of removal (over three States), the variety of potential implementers, and the duration of the implementation period analyzed (30 years), there is some potential for injury or even death of a spotted owl, though unlikely. We estimate the potential for injury or death of one spotted owl per decade of implementation. The protocol requires that in the event of any injury or death of a spotted owl, the designated removal specialist must report this immediately and conduct no further removal activities until the Service reviews the incident and determines whether the barred owl removal can continue (Appendix 2, Section A2.3.1).

3.4.6 Alternative 2 – Preferred Alternative – Proposed Strategy Implementation

Alternative 2 includes the potential for removal of barred owls from management areas across all provinces in the range of the northern spotted owl. These include areas around all recently occupied and newly located spotted owl sites, management of portions of General Management Areas based on their priority rating, and management on portions of several Special Designated Areas (see Chapter 2.4. Maps 2-2, 2-3, and 2-4).

This proposed action would reduce the loss of spotted owl access to available habitat due to competitive exclusion by barred owls, at least within management areas, allowing spotted owls to recolonize these areas and potentially improving the declining spotted owl population trends (Table 3-21). At the edge of the invasion, where displaced spotted owls may remain,

recolonization of the habitat may be rapid (Diller et al 2016, pp. 702-3; Hofstadter 2022, p. 281). However, in the majority of the northern spotted owl range, where spotted owl populations are very low the ability of spotted owls to recolonize these sites is more limited.

In the range of the California spotted owls, all barred owls located on ongoing or future monitoring, inventory, or survey efforts would be removed as soon as practicable after detection across the range of the subspecies and in forest areas representing the potential invasion pathways into the range, including the northern Sierra Nevada area, forested areas in the Central Valley, the forested areas between the Coastal-Southern California population and the Sierra Nevada population, and in the central coast near the border with the southern end of the California Coast province.

Table 3-21. Northern spotted owl population estimate under Alternative 2 – Preferred Alternative – Proposed Strategy Implementation, with 0.5 percent annual increase in spotted owl population in managed areas. and the remaining spotted owls through site management.

Physiographic Province	Estimated Number of Spotted Owl Pairs	Number of Spotted Owl Pairs at Year		
		10	20	30
Olympic Peninsula	41	38	40	42
Western Washington Cascades	66	63	67	70
Eastern Washington Cascades	19	18	19	20
Oregon Coast Ranges	160	151	158	166
Western Oregon Cascades	367	360	378	397
Eastern Oregon Cascades	69	68	71	75
Oregon Klamath	261	248	261	275
California Coast	1,587	1,536	1,615	1,698
California Klamath	938	940	988	1,038
California Cascades	65	63	66	70
TOTAL	3,573	3,485	3,664	3,851

Northern spotted owls

Under Alternative 2, all occupied spotted owl sites would be managed, whether through site management or within a management area. In all provinces and for all potential population trends, the spotted owl populations under Alternative 2 would be higher than under Alternative 1, the no action, resulting in a beneficial effect to northern spotted owls.

California spotted owls

Under Alternative 2, barred owls would be continuously removed as they are located across the range of the subspecies and within the likely invasion pathways, thereby keeping barred owl population growth in check. This includes 8,850,638 acres of forested landscape where barred owls could settle. Increased monitoring in the invasion pathways and the Sierra Nevada and expansive inventory efforts in the Coastal-Southern California population would increase the likelihood of detecting invading barred owls before they can establish breeding populations

within the range of the California spotted owl. Therefore, Alternative 2 would have a beneficial effect on California spotted owls because it would precent barred owls from causing or exacerbating California spotted owl population declines.

3.4.7 Alternative 3 – Management Across the Range

Alternative 3 would allow for barred owl management to be implemented anywhere within the range of the northern or California spotted owls or within 15 miles of the range of the subspecies (Map 2-6) on up to 50 percent of the area. For analysis purposes, we have assumed barred owl management would be distributed evenly across each of the physiographic provinces for the northern spotted owl range, and in the California spotted owl range, assumed the 50 percent would be focused largely on the northern portion of the Sierra Nevada. While total spotted owl populations would increase on the barred owl management areas, the overall effect within each province would be a continuing, though slower, decline (Table 3-22).

Table 3-22. Northern spotted owl population estimate under Alternative 3, with 0.5 percent annual increase in spotted owl population in managed areas with the northern spotted owl range.

Physiographic Province	Estimated Number of Spotted Owl Pairs	Managed and Unmanaged Areas	Number of Spotted Owl Pairs at Year			Province Total at Year 30
			10	20	30	
Olympic Peninsula	41	Unmanaged Area (50%)	9	4	2	23
		Managed Area	19	20	21	
Western Washington Cascades	66	Unmanaged Area (50%)	18	10	6	41
		Managed Area	32	33	35	
Eastern Washington Cascades	19	Unmanaged Area (50%)	4	2	1	11
		Managed Area	9	9	10	
Oregon Coast Ranges	160	Unmanaged Area (50%)	37	17	8	91
		Managed Area	75	79	83	
Western Oregon Cascades	367	Unmanaged Area (50%)	116	73	46	244
		Managed Area	180	189	199	
Eastern Oregon Cascades	69	Unmanaged Area (50%)	21	13	8	45
		Managed Area	34	35	37	

Physiographic Province	Estimated Number of Spotted Owl Pairs	Managed and Unmanaged Areas	Number of Spotted Owl Pairs at Year			Province Total at Year 30
			10	20	30	
Oregon Klamath	261	Unmanaged Area (50%)	67	34	17	154
		Managed Area	124	131	137	
California Coast	1,587	Unmanaged Area (50%)	460	267	155	1,044
		Managed Area	768	808	849	
California Klamath	938	Unmanaged Area (50%)	349	260	193	712
		Managed Area	470	494	519	
California Cascades	65	Unmanaged Area (50%)	20	12	8	43
		Managed Area	32	33	35	
TOTAL	3,573		2,490	1,893	1,545	1,545

Northern spotted owls

Under Alternative 3, barred owls would be managed on 50 percent of the forest lands in each province plus the 15-mile buffer, leaving 50 percent unmanaged for barred owls. The 15-mile buffer adds a total of 5,488,617 forest acres to the area under potential barred owl management. Because the 15-mile buffer is outside the range of the spotted owl subspecies, barred owl management in these areas would not directly lead to increases in the spotted owl population. It would reduce the number of barred owls available to recolonize management areas. Alternative 3 would result in an increase in spotted owl population on the barred owl management areas and would have a beneficial effect to northern spotted owls across their range.

California spotted owls

Under Alternative 3, barred owls would be continuously removed as they are located across the range of the subspecies, within the likely invasion pathways and anywhere within 15 miles of the subspecies' range. The addition of the 15-mile buffer of neighboring areas represents a relatively small but valuable reduction in the potential for barred owls to invade the California spotted owl range, adding 8,555,959 acres of forested lands to the potential management area. This would allow for detection and removal for barred owls that may invade along pathways not previously identified in Alternative 2. Alternative 3 would have a beneficial effect on California spotted owls because it would keep barred owl population growth in check and prevent barred owls from causing or exacerbating California spotted owl population declines.

3.4.8 Alternative 4 – Limited Management by Province/Population

Alternative 4 would allow for barred owl management to be implemented across 100 percent of the highest priority GMA or other mapped area in each province within the range of the northern spotted owls (Map 2.7). Spotted owl populations would increase on the barred owl management areas but given the small portion of most provinces under management in this Alternative, the overall effect within each province is a continuing, though slower, decline (Table 3-23). In the California spotted owl range, barred owl management would be delayed until detections reached

10 percent of surveys in areas within the Sierra Nevada portion of the population, or 5 percent within the Coastal-Southern California portion of the province.

Table 3-23. Northern spotted owl population estimate under Alternative 4, with 0.5 percent annual increase in spotted owl population in managed areas.

Physiographic Province	Estimated Number of Spotted Owl Pairs	Managed and Unmanaged Areas	Number of Spotted Owl Pairs at Year			Province Total at Year 30
			10	20	30	
Olympic Peninsula	41	Unmanaged Area (56%)	10	4	2	21
		Managed Area	17	18	19	
Western Washington Cascades	66	Unmanaged Area (88%)	32	18	10	18
		Managed Area	8	8	8	
Eastern Washington Cascades	19	Unmanaged Area (73%)	6	2	1	6
		Managed Area	5	5	5	
Oregon Coast Ranges	160	Unmanaged Area (69%)	52	24	11	63
		Managed Area	47	49	52	
Western Oregon Cascades	367	Unmanaged Area (77%)	178	112	71	162
		Managed Area	83	87	91	
Eastern Oregon Cascades	69	Unmanaged Area (90%)	38	24	15	22
		Managed Area	7	7	7	
Oregon Klamath	261	Unmanaged Area (64%)	85	44	22	121
		Managed Area	89	94	98	
California Coast	1,587	Unmanaged Area (81%)	746	433	251	574
		Managed Area	292	307	323	
California Klamath	938	Unmanaged Area (77%)	538	400	298	537
		Managed Area	216	227	239	
California Cascades	65	Unmanaged Area (87%)	35	21	13	221
		Managed Area	8	9	9	
TOTAL	3,573		2,490	1,893	1,545	1,545

Northern spotted owls

Under Alternative 4, barred owls would be managed on the smallest area of the action alternatives, though this would be distributed across the range of the species. Spotted owl populations would increase on the barred owl management areas, resulting in at least one area of spotted owl population stability or improvement in each province. Alternative 4 would result in

an increase in spotted owl population on the barred owl management area in each province and would have a beneficial effect to northern spotted owls across their range, though lower than in Alternatives 2 or 3.

California spotted owls

Under alternative 4, barred owl management would be delayed until detections reached 10 percent of surveys in areas within the Sierra Nevada portion of the population, or 5 percent within the Coastal-Southern California portion of the province. This would allow breeding populations of barred owls to be established, providing additional barred owl young to disperse and settle across the range of the subspecies. While removal of barred owl populations at this level can be very successful (Hofstadter et al., 2022, entire), this still increases the potential impacts on spotted owls in the area that are displaced by barred owl prior to the barred owl population level reaching the threshold for barred owl management. This also increases the likelihood of increases in barred owl population throughout the range as additional populations are seeded by the young produced on sites before management begins.

While we have insufficient data to estimate a specific barred owl population level impact, this would substantially increase impacts to California spotted owl populations and risk further establishment of barred owls to a level where complete removal is no longer feasible. Alternative 4 would have a beneficial effect on California spotted owls by removing newly established barred owl populations in the California spotted owl range relatively early in their development. However, because it would allow for establishment of barred owl populations and an increase in barred owls within the subspecies range, it also would have an adverse effect, and could result in declines in California spotted owl population in the vicinity of the barred owl populations. The result would be a small overall adverse effect on California spotted owls.

3.4.9 Alternative 5 – Management Focused on Highest Risk Areas

Alternative 5 would focus barred owl management in the northern portion of the northern spotted owl range, where the subspecies is at greatest risk of extirpation from barred owl competition. Barred owl management could be conducted on 100 percent of two GMAs in the Eastern Washington Cascades, Western Washington Cascades, Eastern Oregon Cascades, Western Oregon Cascades, and Oregon Coast Ranges Physiographic Provinces and one GMA in the Olympic Peninsula Physiographic Province (Map 2-8). Spotted owl populations would increase on the barred owl management areas in the northern portion of the range but given the relatively small portion of most provinces under management in this alternative, the overall effect within each northern province would be a continuing, though slower, rate of northern spotted owl population decline (Table 3-24). Because of the lack of barred owl management in the southern portion of the northern spotted owl range, spotted owl populations in these areas would continue to decline rapidly.

In the California spotted owl range, under this alternative, barred owl management would be limited to the northern Sierra Nevada portion of the subspecies range (32 percent of the range). This alternative would increase monitoring and immediate removal of all territorial barred owls

in the most likely primary pathway for invading barred owls but would allow for barred owls across the rest of the range to settle and increase (Table 3-25).

Northern spotted owls

Under Alternative 5, barred owl management would be focused on the northern portion of the range, where spotted owls are at the highest risk of extirpation. No barred owl management or removal would occur in the southern portion of the range. Alternative 5 would be beneficial to spotted owls in the northern portion of their range by reducing the impact of barred owls in these areas, but an adverse effect on spotted owls in the southern four provinces. By allowing barred owls to continue to increase and expand in the Oregon Klamath and California portions of the northern spotted owl range, this alternative would increase the risk of decline in these spotted owl populations. These are currently the areas where the northern spotted owl populations have the greatest remaining occupancy rates.

Table 3-24. Northern spotted owl population estimate under Alternative 5 in provinces with barred owl management, based on 0.5 percent annual increase in spotted owl population in managed areas.

Physiographic Province	Estimated Number of Spotted Owl Pairs	Managed and Unmanaged Areas	Number of Spotted Owl Pairs at Year			Province Total at Year 30
			10	20	30	
Olympic Peninsula	41	Unmanaged Area (56%)	10	4	2	21
		Managed Area	17	18	19	
Western Washington Cascades	66	Unmanaged Area (67%)	24	14	7	30
		Managed Area	21	22	23	
Eastern Washington Cascades	19	Unmanaged Area (62%)	5	2	1	9
		Managed Area	7	7	8	
Oregon Coast Ranges	160	Unmanaged Area (48%)	36	17	8	95
		Managed Area	78	82	87	
Western Oregon Cascades	367	Unmanaged Area (65%)	150	95	60	199
		Managed Area	126	132	139	
Eastern Oregon Cascades	69	Unmanaged Area (50%)	21	13	8	45
		Managed Area	34	35	37	
TOTAL	722		529	441	398	398

Table 3-25. Northern spotted owl population estimate under Alternative 5 in provinces without barred owl management, using current average annual rate of population change.

Physiographic Province	Estimated Number of Spotted Owl Pairs	Average Annual Rate of Population Change	Number of Spotted Owl Pairs at Year			Province Total at Year 30
			10	20	30	
Oregon Klamath	261	0.935	133	68	35	35
California Coast	1,587	0.947	921	534	310	310
California Klamath	938	0.971	698	520	387	387
California Cascades	65	0.953	40	25	15	15
TOTAL	2,851		1,792	1,147	747	747

California spotted owls

Under Alternative 5, barred owl management would be limited to the northern Sierra Nevada portion of the subspecies range. Barred owls can disperse over very long distances and could move through the northern Sierra Nevada without being detected and removed, particularly since removal efforts work best on territorial barred owls. Dispersing barred owls do not respond to calls or approach, making removal unlikely. While the majority of barred owls removed under studies in the Sierra Nevada to date were within the northern Sierra Nevada management area, (66/76 barred owls, 85 percent) the remaining 15 percent were removed from areas south of the management area. Therefore, Alternative 5 would have a beneficial effect on California spotted owl in the northern Sierra Nevada, but a potentially adverse effect in the remainder of the Sierra Nevada. We anticipate that barred owls would cause or exacerbate declines in California spotted owl populations in the central and southern portions of the Sierra Nevada.

There are currently no confirmed barred owls in the Coastal-Southern California portion of the range. We anticipate that over time, given the long-distance dispersal capability and continuing barred owl population increases to the north, barred owls would invade this area. Under Alternative 5, these barred owls would not be managed, resulting in adverse effects on California spotted owls in this area. We anticipate that eventually, unmanaged population growth of barred owls in the Coastal-Southern California would exacerbate population declines of California spotted owls in this area.

3.4.10 Alternative 6 – Management Focused on Best Conditions

Alternative 6 would focus barred owl management in the southern portion of the northern spotted owl range, where spotted owl populations have not decreased to the degree they have in the north. Barred owl management could occur on up to 75 percent of each GMAs in the Oregon Klamath, California Coast, California Klamath, and California Cascades provinces (Map 2.9). Spotted owl populations would increase on the barred owl management areas in the southern portion of the range, and given the relatively large area under barred owl management, the overall effect within each southern province is a substantial slowing of the rate of decline of northern spotted owl populations (Table 3-26). Because of the lack of barred owl management in the northern portion of the northern spotted owl range, spotted owl populations in these areas would continue to decline rapidly toward extirpation.

In the California spotted owl range, under this alternative, barred owl management would be focused on areas with the best remaining habitat and areas with higher fire resiliency, including 50 percent of the Sierra Nevada portion of the range with the best remaining habitat, and the 75 percent of the Coastal-Southern California portion of the range (Table 3-27).

Northern spotted owls

Under Alternative 6, barred owl management would be focused on the southern portion of the range, where spotted owls are lower immediate risk of extirpation. Barred owls would continue to expand in the northern portion of the range. This would result in an adverse effect on northern spotted owls in Washington and northern Oregon, and likely lead to extirpation of spotted owls in these areas in the near or intermediate term. In the southern portion of the range, Alternative 6 would have a positive effect on spotted owls by focusing barred owl removal in these areas, where spotted owl populations are likely to respond more quickly to barred owl management due to larger starting populations.

Table 3-26. Northern spotted owl population estimate under Alternative 6 in provinces with barred owl management, based on 0.5 percent annual increase in spotted owl population in managed areas.

Physiographic Province	Estimated Number of Spotted Owl Pairs	Managed and Unmanaged Areas	Number of Spotted Owl Pairs at Year			Province Total at Year 30
			10	20	30	
Oregon Klamath	261	Unmanaged Area (60%)	80	41	21	131
		Managed Area	99	104	110	
California Coast	1,587	Unmanaged Area (56%)	516	299	174	921
		Managed Area	676	711	747	
California Klamath	938	Unmanaged Area (31%)	216	161	120	836
		Managed Area	648	682	716	
California Cascades	65	Unmanaged Area (35%)	14	9	6	51
		Managed Area	41	43	45	
TOTAL	2,851		2,291	2,049	1,938	1,938

Table 3-27. Northern spotted owl population estimate under Alternative 6 in provinces without barred owl management, using current average annual rate of population change.

Physiographic Province	Estimated Number of Spotted Owl Pairs	Average Rate of Population Change	Number of Spotted Owl Pairs at Year			Province Total at Year 30
			10	20	30	
Olympic Peninsula	41	0.917	17	7	3	3
Western Washington Cascades	66	0.943	37	20	11	11
Eastern Washington Cascades	19	0.916	8	3	1	1
Oregon Coast Ranges	160	0.926	75	35	16	16
Western Oregon Cascades	367	0.955	231	146	92	92
Eastern Oregon Cascades	69	0.953	43	26	16	16
TOTAL	722		411	237	139	139

California spotted owls

Under Alternative 6, barred owl management would be limited to the 50 percent of the Sierra Nevada portion of the subspecies range and 75 percent of the Coastal-Southern California portion of the range. While we anticipate the implementing entities would choose the highest quality spotted owl areas and the areas most likely to be invaded by barred owls, this still leaves 50 and 25 percent of each portion of the range unmanaged, respectively. Under this alternative, we anticipate barred owl population growth and population establishment would be slower than in Alternative 1, 4 or 5, but would be greater than in Alternatives 2 and 3. As a result, displacement by barred owls would cause or exacerbate California spotted owl population declines, but to a lesser degree than in Alternatives 1, 4, or 5. This would still result in a potential adverse effect to California spotted owls.

3.4.11 Summary of Effects to Spotted Owls

Alternative 1, the no action alternative, would have a significant adverse effect on spotted owls and would result in the greatest decline in spotted owl populations for both subspecies. All the action alternatives would have a positive effect on northern spotted owl populations, though to varying levels. Alternatives 2, 3, and 4 include barred owl removal throughout the range of the northern spotted owls, while Alternatives 5 and 6 would only include removal in certain portions the range and thus contribute less to the recovery of northern spotted owls. Given the declining population of northern spotted owl throughout their range, the management of barred owls at any scale may have a significant beneficial effect on northern spotted owls.

Alternative 2 would have the greatest beneficial effect on spotted owls and result in the largest northern spotted owl population when compared to the other action alternatives due, in part, to the focus on managing recently occupied sites in addition to barred owl management areas and the larger area under management across the range of the northern spotted owl. Alternative 3 would have the greatest area of barred owl removal and provide for larger northern spotted owl

populations than the no action alternative, but lower benefits to northern spotted owl populations than Alternative 2 due to the lack of focus on high priority areas. Alternative 4 would have a substantially smaller beneficial effect on northern spotted owls than Alternative 2 due to the restriction of barred owl management with each province. Alternatives 5 and 6 would include no barred owl management in portions of the northern spotted owl range, leading to adverse effects to northern spotted owls in provinces without barred owl management, though beneficial effects in the provinces where removal would occur. Alternative 5 and 6 would potentially result in the extirpation of northern spotted owls from large portions of their historical range.

In the California spotted owl range, all alternatives would have significant beneficial effects when compared to the no action alternative, though to varying degrees. Alternative 2 would have the greatest significant beneficial effect on California spotted owls because of the inclusion of barred owl management in the invasion pathways which would serve to prevent or slow the southward invasion of barred owls. The removal in buffer areas under Alternative 3 would result in an increased beneficial effect to California spotted owls, though similar to Alternative 2. Alternative 4 would have a significant adverse effect on California spotted owls by allowing barred owls to establish populations before removal efforts are initiated, though still allow for more benefit than the no action alternative by reducing barred owl populations that do become established. Alternative 5 would have a significant beneficial effect on the northern Sierra Nevada, but an adverse effect on a large portion of the California spotted owl population outside of this management area by allowing barred owl populations to become established in the remainder of the range. Alternative 6 would have a significant beneficial effect in the areas where barred owl management occurs but would have an adverse effect on the areas where management is not allowed, leaving room for barred owl populations to be established (Table 3-28).

Table 3-28. Comparison of effects of the alternatives on spotted owls.

Effect	Alternative 1 – No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Northern Spotted Owl Range						
Percent of the forest managed	0	31 plus site management	50	21	23	18
Range-wide number of spotted owl pairs at year 30	886	3,851	2,369	1,545	1,144	2,078
Distribution across range	None	Entire	Entire plus buffer	Entire	North only	South only
Effect on northern spotted owls	Adverse	Beneficial	Beneficial	Beneficial	Beneficial in north, adverse in south	Beneficial in south, adverse in north

Effect	Alternative 1 – No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
California Spotted Owl Range						
Percentage of range under management	0	100	100 plus buffer	100	56	50-75
Distribution across range	None	Entire	Entire plus buffer	Entire	Sierra Nevada only	Entire
Effect on California spotted owls	Adverse	Beneficial	Beneficial	Beneficial and adverse, Small overall adverse	Beneficial in northern Sierra Nevada, adverse in remainder of the range	Adverse

3.5 Other Wildlife Species

Our discussion of the effects of the proposed management of barred owls for the conservation of spotted owls on other wildlife species is focused on the range of the northern and California spotted owls, and adjacent areas described for management. For each alternative, we considered the effects of barred owl removal and associated activities on other wildlife species that overlap with the action.

3.5.0 Changes between Draft and Final EIS

- Provided additional information on the potential disturbance of forest wildlife by shotgun discharges.
- Revised and expanded the discussion of the potential impact of removal on marbled murrelets.
- Added information on the potential for death or injury of non-target species during barred owl removal.

3.5.1 Background and Analytical Methods

Sections 3.3 and 3.4 of this FEIS describe effects to barred owls and northern spotted owls, respectively. Other wildlife species may be affected by the removal of barred owls in the treatment area in three ways: reduction of barred owl predation/competition, disturbance from the removal activities, and the potential for the injury or death of non-target species. These effects are limited to the barred owl management areas. We focused particularly on species identified as at risk or sensitive under Federal and State law, as these are the species more likely to be significantly affected under the alternatives. In this chapter we refer to sensitive

species, a term we use to encompass the variety of at-risk species in the study areas. This term includes various State and Federal designations such as threatened or endangered species, proposed species, candidate species, species of concern, special status species, and sensitive species.

For most species, we developed a general qualitative description of the potential impact of barred owl management. We focused species-specific analyses on species already identified at risk with depressed or declining populations. We started by developing a list of species designated as endangered, threatened, candidate, proposed, or other special status by Federal and State agencies. Using agency and internet databases, we compared the range and habitat of these species to the areas under potential barred owl management and eliminated species whose range or habitat did not overlap potential management of barred owls. We used the diet and potential effects data described below to estimate which of these species were most likely to be affected by barred owl predation or competition and therefore affected by their removal. Given the information on food habits, we conclude that any terrestrial forest species under 35 ounces, or any aquatic forest species that either uses shallows at some point in its life cycle or comes to the surface, are potential prey for barred owls.

The reduction of barred owl populations would reduce barred owl predation and competition in management areas for the duration of management efforts. This would affect not only spotted owls, but many other wildlife species that are either potential prey or competitors of barred owls. We summarized the known and potential effects of barred owls on species other than spotted owls in the northwest, including both documented impacts and potential impacts based on food habits.

Species that are sensitive to human presence or noise may also be affected by the barred owl management. Management activities would involve the presence of individuals or small crews involved in surveying and removal. Surveys may involve traveling off roads or trails to place recording devices or broadcasting conspecific calls as part of location or monitoring. Lethal removal involves the discharging a shotgun one to three times at a site, potentially repeated once or twice a year. Broadcast calls may be detected by humans for some distance, but generally represent a “natural sound”. Shotgun discharge maybe detected over a mile away or more, depending on terrain and atmospheric conditions. Shotgun discharges also raise the potential for injury or death of non-target species that may be in the immediate vicinity.

3.5.2 Affected Environment

Barred owls are generalist predators and opportunistic hunters. While considered primarily nocturnal, they also hunt during the day (Mazur and James 2000, p. 5). Barred owls often hunt from perches, waiting to pounce on potential prey. They have been known to perch over water to catch fish, or wade in shallow water for crayfish or fish. They can hunt from the ground, running and pouncing on prey such as amphibians, and probably plunge into snow for small animals (Mazur and James 2000, p. 5).

Barred owls eat almost any species they encounter, including small mammals, birds, reptiles, amphibians, fish, earthworms, snails, slugs, insects, and crayfish (Baumbusch 2023, entire;

Kryshak et al. 2022, entire; Hamer et al. 2001 entire). They consume a wide variety of birds, including ducks, hawks, other owls, grouse, woodpeckers, and songbirds. The barred owl diet varies across the seasons, taking seasonal advantage of changes in available prey, with amphibians, reptiles, and invertebrates representing a large portion of their summer diet in some areas. A more detailed discussion of prey items can be found in Baumbusch (2023, entire) Kryshak et al. (2022, entire) and Wiens et al. (2014, entire).

Because the impact of a new predator or competitor is likely to be more serious for species that are already reduced in abundance or at risk, we were particularly interested in any direct evidence of endangered, threatened, candidate, or sensitive species in the barred owl diet. For example, Graham (2012, p. 31), analyzed pellets containing 187 prey items collected from the BLM Siuslaw Field Office in Oregon, and from Olympic National Park in Washington. The pellets contained remnants of red tree vole. Baumbusch (2023, pp. 23-25) also found red tree voles in the diet of barred owls in the Oregon Coast Ranges and the Oregon Klamath provinces.

We also sought evidence of barred owl effects on other wildlife species populations. For example, between 1998 and 2002, western screech-owls disappeared from 22 locations in lower mainland British Columbia. The decline of screech owls was linked by timing to the barred owl expansion, predation by barred owls (Wiens et al. 2014, Appendix F, pp. 48-50), and competition for nest cavities and habitat loss (Elliott 2006, p. 8). Declines in screech owl detections coincide with an increase in barred owl detections in the results of 15 years of owl surveys from 1995 to 2010 on Bainbridge Island in Washington, west of Seattle. Barred owls were first detected on the island in 1993. In 1995, western screech-owls were detected at 11 locations on the island. By July 2008, 90 barred owls were detected. No screech owls have been detected since the 2008 to 2009 season (Acker 2012, pp. 134-136).

Wildlife Species Considered in this Analysis:

Any medium to small terrestrial forest species or any aquatic forest species that used shallows at times may be potential prey for barred owl and any species that preys on these may compete with barred owls for their prey. While many species are at risk of predation from barred owls, for common species with large populations this predation generally does not represent a substantial risk to their populations at a regional scale. However, where densities of barred owl are very high, even relatively common species may be at some risk for local population effects (Baumbusch 2023, pp. 29-31).

For rare or endemic species, or species with already depressed or declining populations, added competition with, or predation by, non-native barred owls may have significant effects. Therefore, we have concentrated our species-specific analysis of the effect of barred owl management to species listed as threatened or endangered under State or Federal law, and those identified as State or Federal candidate, proposed, species of concern, special status species, or sensitive species. We have limited this list to species that live in or pass through forest habitat (since species that do not use forests are less likely to be barred owl prey or competitors) and species that barred owls are likely to prey on or compete directly with (eliminating large mammals such as grizzly bears and eliminating all plants).

Table 3-29 displays the Federal and State listed species that occur within the action area and may interact with barred owls. The status of the species provides some indication of its level of risk. That is, endangered species are likely at more risk than sensitive species. These effects may be negative (disturbance) or positive (removal of predation or competition from barred owls in treatment areas). For a more complete list of species of concern, see Appendix 7.

Not all of these species within the range of the northern and California spotted owls are likely to encounter barred owls. For example, river bottom dwellers or species found in large open spaces are not likely to come into contact with barred owl. We limited our list to species that occur in the forest environment and whose range overlaps our analysis area.

Table 3-29. List of Federal and State listed forest species that may be affected by barred owl management actions. Listing status E = endangered, T = threatened, C = candidate, PT = proposed threatened, PE = proposed endangered. For State status, S = species of concern or other designation. State designations nomenclature varies across the States, therefore, species of concern is a general category of species on various State lists that do not fit the above categories.

Species	**Listing Status**				**Potential Interaction with Barred Owl**	
Common Name	**Federal**	**WA**	**OR**	**CA**	**Prey**	**Competitor**
Mammals						
Canada Lynx *Lynd canadensis*	T	E	-	-		Yes
Cascade Red Fox *Vulpes vulpes cascadensis*	-	E	-	-		Yes
Fisher *Pekania pennanti*	E (in part)	E	S	T/S		Yes
Mazama Pocket Gopher *Thomomys mazama*	T	T	-	-	Yes	
Pacific (Humboldt) Marten *Martes caurina humboldtensis*	T (in part)	-	S	E		Yes
Point Arena Mountain Beaver *Aplodontia rufa nigra*	E	-	-	S	Yes	
Red Tree Vole *Arborimus longicaudus*	C	-	S	-	Yes	
Riparian Brush Rabbit *Sylvilagus bachmani riparius*	E	-	-	E	Yes	
Riparian Woodrat (=San Joaquin Valley) *Neotoma fuscipes riparia*	E	-	-	-	Yes	
Sierra Nevada Red Fox *Vulpes vulpes necator*	E	-	S	T		Yes
Western Grey Squirrel *Sciurus griseus*	-	T	S	-	Yes	
BIRDS						
Belding's Savannah Sparrow *Passerculus sandwichensis beldingi*	-	-	-	E	Yes	

Species	Listing Status				Potential Interaction with Barred Owl	
Common Name	**Federal**	**WA**	**OR**	**CA**	**Prey**	**Competitor**
Great Grey Owl *Strix nebulosa Yosemitensis*	-	-	S	E		Yes
Little Willow Flycatcher *Empidonax traillii brewsteri*	-	-	-	E	Yes	
Marbled Murrelet *Brachyramphus marmoratus*	T	E	E	E	Yes	
Spotted Owl *Strix occidentalis*	T	E	T	T/S		Yes
Oregon Vesper Sparrow *Pooecetes gramineus affinis*	-	E	S	S	Yes	
Southwestern Willow Flycatcher *Empidonax traillii extimus*	T	-	-	E	Yes	
Western Yellow-billed Cuckoo *Coccyzus americanus*	T	E	-	E	Yes	
AMPHIBIANS AND REPTILES						
California Red-legged Frog *Rana draytonii*	T	-	-	S	Yes	
California Tiger Salamander *Ambystoma californiense*	E/T	-	-	T	Yes	
Foothill Yellow-legged Frog *Rana boylii*	PE/PT	S	S	E/T	Yes	
Kern Canyon Slender Salamander *Batrachoseps simatus*	PT	-	-	T	Yes	
Limestone Salamander *Hydromantes brunus*	-	-	-	T	Yes	
Mountain Yellow-legged Frog *Rana muscosa*	E	-	-	E	Yes	
Oregon Spotted Frog *Rana pretiosa*	T	S	S	S	Yes	
Relictual Slender Salamander *Batrachoseps relictus*	PE	-	-	S	Yes	
San Francisco Garter Snake *Thamnophis sirtalis tetrataenia*	E	-	-	E	Yes	
Southern Rubber Boa *Charina umbratica*	-	-	-	T	Yes	
Santa Cruz Long-toed Salamander *Ambystoma macrodactylum croceum*	E	-	-	E	Yes	
Scott Bar Salamander Plethodon asupak	-	-	-	T	Yes	
Shasta Salamander *Hydromantes shastae, H. samweli, H. wintu*	-	-	-	T	Yes	

Species	Listing Status				Potential Interaction with Barred Owl	
Common Name	**Federal**	**WA**	**OR**	**CA**	**Prey**	**Competitor**
Sierra Nevada Yellow-legged Frog *Rana sierrae*	E	-	-	T	Yes	
Siskiyou Mountains Salamander *Plethodon stormi*	-	-	S	T	Yes	
Western Pond Turtle *Actinemys marmorata*	PT	E	S	S	Yes	
Yosemite Toad *Anaxyrus canorus*	T	-	-	S	Yes	
Fish						
Bull Trout DPSs *Salvelinus confluentus*	T	C	S	E	Yes	
Chinook Salmon DPSs *Oncorhynchus tshawytscha*	E/T	-	T	E/T	Yes	
Coho Salmon DPSs *Oncorhynchus kisutch*	E/T	-	E/S	E/T	Yes	
Eulachon *Thaleichthys pacificus*	T	-	-	-	Yes	
Lahontan Cutthroat Trout *Oncorhynchus clarkii henshawi*	T	-	T	-	Yes	
Little Kern Golden Trout *Oncorhynchus aguabonita whitei*	T	-	-	-	Yes	
Paiute Cutthroat Trout *Oncorhynchus clarkii seleniris*	T	-	-	-	Yes	
Steelhead DPSs *Oncorhynchus mykiss irideus*	E/T	C	S	E/CE	Yes	
Invertebrates						
California Freshwater Shrimp *Syncaris pacifica*	E	-	-	-	Yes	
Trinity Bristle Snail *Monadenia infumata setosa*	-	-	-	T	Yes	

3.5.3 Environmental Consequences

We evaluated the potential for barred owl removal to have significant effects on potential prey and competitor species and the potential for barred owl removal to result in disturbance that would significantly impact species. The action alternatives all have two potential effects on species other than barred and northern spotted owls: the indirect effects from the removal of barred owls on the species' populations and the direct effects of the removal activities, primarily related to disturbance.

In barred owl management areas, the reduction of barred owl populations to lower levels could positively affect prey species or species with which barred owls compete for prey,

habitat, or space. It could reduce pressure on barred owl prey species (small vertebrates and invertebrates) and reduce competition with other predators of small vertebrates and invertebrates (e.g., owls, hawks, raccoons, and American marten) for the duration of barred owl management. In areas where barred owl populations are not yet established, barred owl management would prevent negative effects on potential prey and competitor species. We have focused our analysis of effects on species already at risk or with reduced populations, where the reduction in predation or competition has the greatest potential impact on the overall population health.

Effects on Prey

We examined existing food habit data to identify if any of the Federally listed, candidate, or sensitive species have been documented as barred owl prey. Remains of 147 red tree voles were found in samples, representing 1.8 percent of prey biomass in a Eugene BLM barred owl diet study (Graham 2012, p. 80) and tree voles were a component of the diet of barred owls in the Oregon Coast Ranges and Oregon Klamath study areas (Baumbusch 2023, pp. 23-25). Kryshak et al. (2022, p. 7) did not detect any listed species, but noted that such species were by their nature rare and easily missed with samples representing limited geography and a single day of diet information. They did find evidence of significant predation of amphibians indicating a potential risk to threatened or endangered amphibians. Failure to detect a species in current barred owl food habit studies does not indicate that they are not taken on occasion as opportunity allows, only that they are not a primary food item in the areas where the studies have been conducted. For endangered or threatened species, even opportunistic predation may be of substantial concern.

Some species found in prey studies may indicate that similar endangered, threatened, proposed, candidate, or sensitive species are also likely prey. For example, the Pacific sideband snail, which was found in the barred owl diet study, is similar to the Trinity bristle snail, listed as threatened in the State of California and found within barred owl study areas. Some species appear to be vulnerable though we have no hard evidence they are barred owl prey. While marbled murrelets have not been found in barred owl prey studies, young marbled murrelets are likely vulnerable to opportunistic predation while in the nest. Adult murrelets may also be vulnerable if caught while incubating eggs or brooding young. Marbled murrelet nesting habitat is also barred owl habitat, making an encounter likely.

Species which are documented as prey or potential prey for barred owls may experience a positive effect of reduced predation on the treatment areas as long as barred owl management continues, though the scale of the effect would be on the location of eventual barred owl management related to the range and population of the prey species. In areas where barred owl populations are not yet established, potential prey species would not experience reductions in their populations as a result of barred owl invasion, because barred owl management would prevent the establishment of barred owl populations. However, given the limited information available and the uncertainty concerning overlap between potential prey populations and barred owl management, we could not identify any significant beneficial effects on any specific prey species from the barred owl management action alternatives.

Effects on competitors

There are limited data demonstrating past effects of barred owls on the populations of potential competitors, other than spotted owls. The competitive exclusion of spotted owls by barred owls likely includes competition for space (habitat) and prey. However, their density and the wide diversity of prey consumed, and the results of analyses in Baumbusch 2023 (pp. 29-31), suggest strongly that barred owls are likely reducing prey populations previously available to native predators. Some such predators, including fisher, Pacific marten, and Sierra Nevada red fox are themselves threatened or endangered, and additional competition for prey from barred owls may have an adverse effect on their survival and recovery. The scope and scale of this effect from reduced competition would be dependent on the eventual location of barred owl management compared to the range and population of potential competitor species. In areas where barred owl populations are not yet established, potential competitor species would not experience reductions in their populations as a result of barred owl invasion, because barred owl management would prevent the establishment of barred owl populations. Given the limited information available and the uncertainty concerning overlap between potential competitor populations and barred owl management, we could not identify any significant beneficial effects to any specific competitor species from the barred owl management action alternatives.

Disturbance from Surveys

The potential for direct disturbance effects from barred owl removal depends on the type and intensity of the activity and the sensitivity of the species. Surveys for spotted and barred owls involve the presence of surveyors in vehicles along roads and walking on trails, or off trail for survey work. These are activities similar to those that normally occur within forest landscapes, so we do not anticipate this activity would result in an increasing background level of human presence. Therefore, this portion of the activity has no significant effect on other wildlife species.

Some surveys and most removals would involve using recorded barred owls calls at survey points to locate barred owls. Areas targeted for management are those where barred owl presence has already been detected via barred owl calls. Animals in these areas are likely already hearing barred owl calls on a regular basis and may be habituated to these sounds. If members of a species are very sensitive to, and disturbed by, the sound of barred owls, this could still elicit a reaction. However, only a few surveys would be conducted each year in any location, resulting in very low exposure. Therefore, surveys would not likely increase the background level of barred owl calling significantly, and we anticipate no significant effect of barred owl calling surveys on other wildlife species under all alternatives. This leaves the effects of removal work itself.

Disturbance from Removal Work

Lethal removal involves the presence of an individual or small crew at the site for a short period (15 minutes to 1 hour) and the sound of gunshots. Most of the areas designated for removal are generally open for human use, whether by the landowner or the public, so the presence of a small crew is within the normal background activity. Therefore, we do not

anticipate effects from the crew's presence.

Removal of barred owls involves one to three shotgun discharges, primarily at night. The discharges would be separated by a few minutes or days, depending on whether both members of the barred owl pair are removed in a single visit. The sound of gunshots is loud, but short. A 12-gauge shotgun has a noise level of about 150 decibels (dB) at the site of the shot, which attenuates with distance. The distance at which the sound reaches background levels can be further affected by steep slopes, ridges, and dense vegetation, all of which increase the rate of attenuation. Most barred owl removal would be conducted from roads or trails in heavily forested landscapes, leading to greater attenuation of the sound of the shot than would occur in open areas. Because of the instantaneous nature of a gunshot, and variables such as topography, ground cover, forest density, background ambient noise levels, varying sensitivity of wildlife species, and many other factors, it is difficult to generalize the distance at which the noise from the shot would disturb wildlife.

In areas with dense barred owl populations, additional shots may be taken during a single night to remove barred owls on neighboring barred owl territories. Removal locations are based on the presence of a territorial barred owl and are likely at least one-half mile or more apart. Because barred owls may reoccupy sites within a single season, removal could happen up to two or three times a year at some sites, separated by weeks or months.

Most of the barred owl management areas, with the exception of National and State Parks, are open for hunting (most of which happens in the fall) and target shooting. The limited shooting of barred owls in these areas is likely to blend into the background noise and not affect most species during hunting seasons. In National and State Parks, areas within the park but near the boundary, animals may experience some limited level of habituation to hunting and shooting on neighboring lands. In areas deeper within a National or State Park, sounds of shots may be novel. To the extent that individual animals in these areas react to the novel stimulus of the discharge, this may cause some potential for short-term disturbance.

Disturbance of wildlife from the sound of shotgun discharges has not been extensively studied, though there have been some studies related to loud noises, military operations, and hunting. Delaney et al. (2011, p. 16) notes that it is important to consider whether an animal is responding to the noise alone, or to some other aspect of a potentially disturbing activity such as visual stimuli, and that it is difficult to separate the effect of noise from visual aspects. In terms of barred owl management, where removal is primarily done from a road or trail in forested areas at night and the barred owls are drawn to these areas, the primary stimulus for disturbance is assumed to be auditory and not visual.

Boyles (1995, p. 129) summarized the response of perched and nesting raptors from the close approach by aircraft. She notes that raptors flush more often when roosting (22.61 percent) than when incubating or brooding (6.62 percent) and that nesting raptors leave the nest for only a few minutes (Boyles 1995, pp. 128-9). We note that the duration of disturbance by closely approaching aircraft is substantially longer than the shotgun discharge and includes other disturbance stimuli from the presence of the aircraft overhead. Delaney et al. (2011, p. 32) noted that if disturbance events are infrequent, bird behavior can quickly return to the

before-disturbance behavior.

Delaney et al. (2011, entire) conducted extensive experimental of the behavioral responses of red cockaded woodpeckers to military training. Red cockaded woodpeckers were exposed to 50-caliber blank machine gun fire (one-to-five-minute bursts) and artillery simulators (single explosive detonation) at various distances from nests. The latter is the most similar to the potential effects of barred owl removal, though it is conducted during the day, and there are personnel present that may affect the response. For the artillery simulators, the authors observed flushing from blasts 50 feet from the nest, 50 percent at 300 feet and none at 500 feet or more away from the nests. They also observed responses from non-experimental military training events at 650 feet or more from the nest sites. The authors found no effect on reproduction from non-experimental military training events and a small but nonsignificant decrease in reproductive measures between experimental treatment and control woodpeckers. They concluded that "[o]ur data indicate that infrequent, short-duration (<2 hr) military training exercises at the levels and for the noise sources tested close to active woodpecker nest sites did not impact woodpecker reproduction on the Fort Stewart Military Installation. . . . We do not suggest that woodpeckers cannot be disturbed by the military activities, but at the levels and for the types of stimuli we tested, we did not observe a significant impact on woodpecker reproduction or productivity" (Delaney et al. 2011, p. 33).

The most serious potential effect of noise is panic flushing by nesting birds that results in the ejection of eggs or young from the nest. Boyles (1995, pp. 128-9) further noted "Although raptors can knock eggs from nests in panics (C. M. White pers. comm.), experiments using a total of 211 nests exposed to blasting, gunshots, and low- altitude overflights found that no eggs or young were ever ejected." Cavity nesting birds, or birds that build substantial nests are much less likely to experience egg or chick loss. Birds that lay eggs on the native substrate or with minimal nest cups may be at higher risk.

Based on the above studies and summaries, we do not anticipate any significant effect or response from the limited disturbance of one to three shotgun reports at dusk or night for most species, due to the limited duration and scope of the disturbance and the infrequency of removal efforts under any action alternatives. While individuals may respond by startling, or even flushing (flying or moving away from the noise), these are often very limited and normal responses that are unlikely to permanently affect individuals or populations. Nesting birds are unlikely to abandon nests from this limited level and duration of disturbance and short-term disruption of incubation or feeding is unlikely to significantly affect reproduction for most species. Of all the species listed in Table 3-29, few are likely to be disturbed by barred owl removal activities, with the possible exception of the marbled murrelet, an endangered species that nests in old forest stands and overlaps with potential barred owl management areas in all action alternatives (see following section on *Disturbance of Marbled Murrelets*).

Disturbance of Marbled Murrelets

As described above, for species with already depressed population levels, a disturbance such as shooting that occurs at a sensitive time in their life history could have individual-level effects. Marbled murrelets are an endangered seabird that nest in old-growth forests

characterized by large trees, multiple canopy layers and moderate to high canopy closure. Murrelets do not build nests but lay a single egg on a mat of moss, lichen or debris accumulations on these branches or deformities.

We did identify a potential for disturbance to marbled murrelets from shotgun discharge under certain conditions, where the range of the marbled murrelet overlaps with potential barred owl removal activity (Map 3-1),) removal occurs near known or potentially occupied marbled murrelet nesting habitat, and removal activities occur during the marbled murrelet nesting season (generally late March through late September, depending on the location).

Under all action alternatives, the proposed actions could occur during the murrelet nesting season and in nesting habitat. Most barred owl removal would occur in the early spring and summer during barred owl nesting season, and again in the fall when barred owls become more responsive. The spring and summer removal periods overlap marbled murrelet nesting season, the fall removals would not. Barred owls use a wide variety of forest conditions. While some of these do not contain murrelet nesting habitat, most murrelet nesting habitat is potential barred owl habitat. Adult marbled murrelets typically feed young around dawn and dusk, although fewer feedings take place at dusk and during the day. Barred owl removal often happens at dusk or in the early evening. If the gunshots are in the immediate vicinity of an active nest and happen when murrelet adults are returning to the nest, this could potentially delay or interrupt the feeding of young. In most cases, if feeding is delayed or interrupted only once during the period when the chick is on the nest, the effect to the chick would be minimal. Nonetheless, to reduce the potential disturbance of marbled murrelets during feeding, we are limiting shooting within potential marbled murrelet habitat during the breeding season for the two hours before and after dawn as part of the protocol, applicable to all action alternatives (Appendix 2, Section A2.2.1).

Excessive noise, particularly if repeated often, can result in an aborted food delivery by adults to the young or may flush brooding adults thus potentially exposing its egg or young to predation, or cause premature fledging of young. However, summary studies on the effects of disturbance have not documented any nest failure, abandonment, or chick mortality directly attributed to noise disturbance (Singer et al. 1995, entire; Hamer and Nelson 1998, entire; Golightly et al. 2002, entire).

Noise from the discharge of the shotgun is loud (about 150 dB at the site of the shot), but of very limited duration. Under the barred owl removal protocol, one to three discharges of a shotgun would occur at a location adjacent to or within forested areas for each removal attempt separated by a few minutes to a few days. Removal on adjacent sites would likely be at least one-half mile away, reducing the potential for additional disturbance. Barred owls may reoccupy these sites within a single season, therefore one to two additional removals may occur within a single year on some sites.

In areas where murrelet breeding populations are low, the likelihood that an individual removal effort would occur within the vicinity of an active nest at the exact time that the adults are delivering food is low, but not zero. With increased barred owl management, the potential that such an event would occur at least once would increase. The higher the murrelet nesting

population density, the more likely an interaction with barred owl removal.

Given the above, we anticipate a low likelihood of a measurable negative impact to marbled murrelet populations in most of the barred owl management areas, due to the limited potential for, and short duration of, exposure to shotgun noise. However, when considered over the expanse of potential barred owl management areas, some individual murrelets would likely be exposed to removal activity and may be affected by short term disturbance associated with the discharged of a firearm.

At the population level, the effects of barred owl removal efforts on individual murrelets could have a small but potentially positive effect by reducing the potential for murrelet predation by barred owls. Disturbance of nesting murrelets by the nearby discharge of shotguns could result in effects to individuals, but likely would have little to no effect on murrelet populations. Removal of barred owls in the fall, after the marbled murrelet breeding season would not result in potential disturbance, as would removal in the late winter/early spring before murrelet nesting begins. In special cases, disturbance to murrelets may be reduced by using alternative methods, such as trap and euthanize" or a "quiet" shotgun (see Appendix 3). However, these techniques are not always practical to employ, and we have not made them a requirement for barred owl removal under all alternatives. Therefore, because of the low likelihood of disturbance in most areas due to the scattered and low number of murrelet nests, the short duration of the disturbance, and the limitation on removal activities during the morning hours, disturbance from barred owl removal would not have a significant adverse effect on marbled murrelet populations under any of the alternatives.

We have not identified any significant effects from disturbance to any other endangered, threatened, candidate, or sensitive species under any alternative.

Potential for death or injury of non-target species.

As described above, removal involves the discharge of shotguns in the evening and at night. Under the removal protocol (Appendix 2), these shots are taken at barred owls that are perched, facing the removal specialist, within 30 yards, and with no intervening obstructions. The Service developed the removal protocol in part to ensure, to the extent possible, that no non-target species are injured or killed during barred owl removal. This removal protocol has been used in several research studies, involving the removal of over 4,500 barred owls, without a single non-target species injury or loss.

The protocol includes strong requirements to ensure the identity of the barred owl before removal, using vocal and visual characteristics. This is the first element of the protocol that reduces the potential for injury of non-target species. The presence of people and vocal barred owls likely reduces the potential that other species will remain in the area during the removal process and therefore be vulnerable to stray pellets. The shots are taken in forest conditions, so pellets do not travel far before being stopped or slowed by contact with vegetation. Finally, the protocol requires that removal specialists are prepared to respond if non-target species are injured (Appendix 2, Section A2.2.2.). Based on the protections included in the removal protocol, there is very little potential for injury or death of non-target species during barred owl

removal and we do not anticipate any significant effect to non-target species from incidental death or injury under any alternative.

Map 3-1. Overlap of marbled murrelet inland range and northern spotted owl range.

3.5.4 Alternative 1 – No Action

Under the no action alternative, no systematic barred owl management strategy would be finalized or implemented, and the Service would not obtain a permit for management of barred owls. Barred owls would continue to expand within the northern spotted owl range. As barred owls continue to expand their range and populations within the northern spotted owl range, vulnerable species would experience increasing predation or competition (Holm et al. 2016,

entire). Barred owls would continue to invade the California spotted owl range, eventually affecting potential prey and competitor species within the Sierra Nevada and southern California forests.

3.5.5 Effects Common to All Action Alternatives

Barred owls, as a generalist non-native predator, exert pressure on many species not adapted to this novel source of predation. Removal of barred owls have a potential beneficial effect on potential prey or competing native predators. The species beneficially affected by each action alternative would vary due to differences in the location of barred owl management. The species potentially affected by each action alternative varies based on the location of barred owl management. Table 3-30 provides a list of Federal or State listed species that may be beneficially affected by barred owl management under each action alternative.

Table 3-30. Federal and State listed forest species that may be beneficially affected by barred owl management under the action alternatives.

Species	Action Alternative				
	2	3	4	5	6
Mammals					
Canada Lynx	Yes	Yes	Yes	Yes	-
Cascade Red Fox	Yes	Yes	Yes	Yes	-
Fisher (Sierra Nevada DPS)	Yes	Yes	Yes	Yes	-
Pacific (Humboldt) Marten	Yes	Yes	Yes	Yes	Yes
Mazama Pocket Gopher	-	-	-	-	-
Point Arena Mountain Beaver	Yes	Yes	-	-	Yes
Riparian Brush Rabbit	Yes	Yes	-	-	-
Riparian Woodrat (=San Joaquin Valley)	Yes	Yes	-	-	-
Red Tree Vole	Yes	Yes	-	Yes	-
Sierra Nevada Red Fox	Yes	Yes	-	Yes	Yes
Western Grey Squirrel	Yes	Yes	Yes	Yes	-
Belding's Savannah Sparrow	Yes	Yes	-	Yes	Yes
Birds					
Belding's Savannah Sparrow	Yes	Yes	-	Yes	Yes
Great Grey Owl	Yes	Yes	Yes	Yes	Yes
Little Willow Flycatcher	Yes	Yes	Yes	Yes	Yes
Marbled Murrelet	Yes	Yes	Yes	Yes	Yes
Spotted Owl	Yes	Yes	Yes	Yes	Yes
Oregon Vesper Sparrow	Yes	Yes	Yes	Yes	Yes
Southwestern Willow Flycatcher	Yes	Yes	-	Yes	Yes
Western Yellow-billed Cuckoo	Yes	Yes	Yes	Yes	Yes
Amphibians And Reptiles					
California Red-legged Frog	Yes	Yes	Yes	Yes	Yes
California Tiger Salamander	Yes	Yes	-	Yes	Yes
Foothill Yellow-legged Frog	Yes	Yes	Yes	Yes	Yes
Kern Canyon Slender Salamander	Yes	Yes	-	Yes	Yes

Species	Action Alternative				
	2	3	4	5	6
Limestone Salamander	Yes	Yes	-	Yes	Yes
Mountain Yellow-legged Frog	Yes	Yes	-	Yes	Yes
Oregon Spotted Frog	Yes	Yes	Yes	Yes	-
Relictual Slender Salamander	Yes	Yes	-	Yes	Yes
San Francisco Garter Snake	Yes	Yes	-	-	-
Santa Cruz Long-toed Salamander	Yes	-	-	-	-
Scott Bar Salamander	Yes	Yes	Yes	-	Yes
Shasta Salamander	Yes	Yes	Yes	-	Yes
Sierra Nevada Yellow-legged Frog	Yes	Yes	Yes	Yes	Yes
Siskiyou Mountains Salamander	Yes	Yes	Yes	-	Yes
Southern Rubber Boa	Yes	Yes	-	Yes	Yes
Western Pond Turtle	Yes	Yes	Yes	Yes	Yes
Yosemite Toad	Yes	Yes	-	Yes	Yes
Fish					
Bull Trout DPSs	Yes	Yes	Yes	Yes	Yes
Chinook Salmon DPSs	Yes	Yes	Yes	Yes	Yes
Coho Salmon DPSs	Yes	Yes	Yes	Yes	Yes
Eulachon DPS	Yes	Yes	Yes	Yes	Yes
Lahontan Cutthroat Trout	Yes	Yes	Yes	Yes	Yes
Little Kern Golden Trout	Yes	Yes	-	Yes	Yes
Paiute Cutthroat Trout	Yes	Yes	-	Yes	Yes
Steelhead DPSs	Yes	Yes	Yes	Yes	Yes
Invertebrates					
California Freshwater Shrimp	Yes	Yes	Yes	-	Yes
Trinity Bristle Snail	Yes	Yes	Yes	-	Yes

As described above, marbled murrelets may be disturbed by the noise involved with the removal of barred owls, if removal occurs within the range of the murrelet, within nesting habitat, and during the nesting season. This limits the provinces and potential barred owl management areas where murrelets could be adversely affected. Provinces where overlap occurs include the majority of the Olympic Peninsula, Oregon Coast Ranges, and California Coast provinces and portions of the Western Washington Cascades, Eastern Washington Cascades, Oregon Klamath, and California Klamath provinces. Because the area of barred owl management varies by alternative, the potential area of impact for marbled murrelets varies (Table 3-31).

Table 3-31. Acres of potential barred owl management areas within the range of the marbled murrelet.

Physiographic Province	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Olympic Peninsula	736,259	1,360,997	1,398,653	1,398,653	0
Western Washington Cascades	1,491,068	2,143,974	767,542	1,930,908	0
Eastern Washington Cascades	487,626	398,677	580,039	975,251	0
Oregon Coast Ranges	1,626,348	2,726,934	1,789,726	2,938,414	0
Western Oregon Cascades	4,200	127,431	0	0	0
Oregon Klamath	268,790	768,864	201,470	0	403,184
California Coast	1,905,627	1,490,680	725,807	0	1,866,928
California Klamath	374,776	430,348	651,140	0	562,163
TOTAL	6,894,691	9,447,908	6,114,377	7,243,226	2,832,275

3.5.6. Summary of effects of the alternatives on other wildlife species.

Barred owls are a generalist predator that exerts pressure on species not adapted to this new source of predation, leading to negative effects on potential prey species and competitors for the prey. Barred owl removal in the northern spotted owl range would have a beneficial effect on potential prey species by reducing this novel source of predation and on potential competitors by reducing competitive pressure. Barred owl removal in the California spotted owl range would prevent negative effects of barred owl predation and competition by preventing the establishment of barred owl populations in the areas described in the alternatives. The specific species affected would vary by location of barred owl management, as displayed in Table 3-30. Based on the limited information available and the uncertainty concerning overlap between potential prey and competitor populations and barred owl management areas, we could not identify any significant beneficial effects on any specific prey or competitor species from any of the action alternatives, separate from the generalized benefit of removing a new source of predation.

Surveys would not likely increase the background level of barred owl calling significantly, and we anticipate no significant effect of barred owl calling surveys on other wildlife species under all alternatives. The act of removing barred owls involves discharge of shotguns and the noise associated with that discharge. We do not anticipate any significant effect or response from the limited disturbance of one to three shotgun reports at dusk or night for most species, due to the limited duration and scope of the disturbance and the infrequency of removal efforts under any action alternatives, with the possible exception of marbled murrelets.

Murrelets are relatively easy to disturb and disturbances during chick raising could potentially delay or interrupt the feeding of young. However, because feeding is likely to be delayed or interrupted only once during the period when the chick is on the nest, the effect to the chick would be minimal. Therefore, barred owl management activities that overlap the marbled murrelet range (Table 3-31) would have a potential small, adverse effect on individual marbled murrelets. The potential degree of this impact at the murrelet population level depends on the area of removal activity that overlaps the range of the murrelet. This would be lowest under Alternative 6 and limited to the southern portion of the murrelet's range. The potential impact would be greatest under Alternative 3 due to the large overlap with marble murrelet habitat in

Washington, Oregon, and California. Based on the low likelihood of disturbance of marbled murrelets in most areas, the short duration of the disturbance, and the limitation on removal activities during the morning feeding hours, disturbance from barred owl removal under all action alternatives would not have a significant effect on marbled murrelet populations.

Based on the protections included in the removal protocol, there is very little potential for injury or death of non-target species during barred owl removal and we do not anticipate any significant effect to non-target species from incidental death or injury under any action alternative.

3.6 Recreation and Visitor Use

Our discussion of the effects of the proposed management of barred owls on recreation and visitor use is focused on the range of the northern and California spotted owls, and adjacent areas described for management. For each alternative, we considered the effects of barred owl removal and associated activities on designated recreational areas or areas heavily used by visitors that overlap with the action.

3.6.0 Changes between Draft and Final EIS

- No substantial changes.

3.6.1 Background and Analytical Methods

For the purpose of this analysis, and to effectively illuminate differences in the outcomes under the alternatives, we assumed that barred owl management would begin immediately at a maximum of 10 percent implementation in year 1, 50 percent in year 2, and full implementation in year 3 and beyond in the northern spotted owl range. Given the focus on removing all located barred owls and the smaller number involved, we assume full implementation starting in year 1 for the California spotted owl range. The analysis runs for 30 years. This represents two lifespans of spotted and barred owls and allows time to predict and analyze differences between alternatives.

Given the proposed management of barred owls throughout areas in Washington, Oregon, and California, we anticipate that at least some activities associated with the proposed action would occur within, or adjacent to, designated recreational areas or areas heavily used by visitors. The primary mechanism for effects to recreation and visitor use includes the presence of small crews on the ground and the sound of firing the shotgun at barred owl sites, the latter having the most potential for disruption. The presence of small crews (one to three people) involved in surveying and removal are within the normal size of groups using all lands under consideration for barred owl management and we do not anticipate any substantial effect of their presence.

We anticipate that the sound of gunshots is more apt to disturb visitors and recreationists. Visitor expectations and responses to these mechanisms are dependent on their expectations of land management within an area. Impacts from sounds or activities that are unexpected in one area may be unremarkable and not cause disturbance to visitors or recreationists in another setting. For example, the sound of gunshots in a National Park where hunting is not allowed

would be notable, while gunshots on National Forest and BLM managed public lands during the hunting season would not. Even in National Parks, gunshots may be heard near the borders of the parks where the neighboring lands are open for hunting.

The sound of gunfire is sharp, loud, but short. A 12-gauge shotgun has a momentary noise level of about 150 dB at the site of the shot. For comparison, this is equivalent to firecrackers or a close lightning strike. This sound attenuates with distance, and can be further affected by steep slopes, ridges, and dense vegetation, all of which increase the rate of attenuation. Most barred owl removal would be conducted from roads or trails in heavily forested landscapes within the northern spotted owl range, leading to greater attenuation of the sound of the shot. Within the range of the California spotted owl, barred owl removal would also be conducted primarily from roads and trails, but in a variety of forested and woodland landscapes. A gunshot may be audible to humans as much as a mile away, depending on the topography, ground cover, forest density, and background ambient noise levels.

Since the primary effects of barred owl lethal removal on recreation and visitor use is related to the sound of shotguns, we considered whether hunting or target shooting was likely under different ownerships, how likely it is for a visitor to hear gunshots in these areas, the timing or seasonality of the gunshots, and the potential for visitors to be present in the area during the removal activity.

3.6.2 Affected Environment

Barred owl management could occur on all or part of ten National Park or Monument units managed by the National Park Service in the range of the northern spotted owl. These include North Cascades National Park and Ross Lake National Recreation Area, Olympic National Park, and Mount Rainier National Park in Washington; Crater Lake National Park and Oregon Caves National Monument and Preserve in Oregon; and Redwood National Park, Whiskey Town National Recreation Area, Lassen Volcanic National Park, Muir Woods National Monument, Golden Gate National Recreation Area, and Point Reyes National Seashore. Additionally, the Forest Service and BLM manage similar areas including the Mount Saint Helens National Volcanic Monument, Columbia River Gorge National Recreation Area, Cascade Siskiyou National Monument, Berryessa Snow Mountain National Monument, Giant Sequoia National Monument, and San Gabriel Mountains National Monument.

Barred owl management could occur on all or part of four National Park units in the range of the California spotted owl: Lassen Volcanic, Sequoia & Kings Canyon and Yosemite National Parks, as well as Devil's Postpile National Monument. We anticipate that barred owl management activities involving firearms would be excluded in populated areas (e.g., NPS housing, developed areas, and open established campgrounds).

We have organized our discussion around three categories, based on differences in land ownership and management: (1) National Parks, where hunting is typically not allowed; (2) other Federal lands (National Forests, BLM-administered lands, and some National Recreation Areas) outside of wilderness areas, where hunting, and some target shooting, is generally allowed; and (3) non-federal lands, where hunting and shooting may or may not be allowed.

In this section, we discuss the relevant context of different landscapes in the affected environment. In particular, we describe whether these areas are open to hunting or shooting, and whether this is likely to disturb visitors.

National Parks

The greatest potential for disturbance effects to recreation or visitor use occurs in National Parks where hunting is typically not allowed; therefore, we conducted a detailed review of National Park policies and processes.

The National Park Service Management Policies (NPS 2006, entire) guides management at the parks, which help parks manage their resources as dictated by unique park-by-park underlying legislation and also the Organic and Redwoods Acts of 1916, and 1978, respectively. National Park units may also have enabling legislation or presidential proclamations with park-specific mandates. The National Park Service manages National Parks, some National Monuments, and some National Recreation Areas. Ross Lake National Recreation Area, while managed by the National Park Service, is open for hunting.

The primary mission of the NPS is the preservation of resources, including natural resources, in an unimpaired condition. The Management Policies recognize that non-native (also called "exotic" or "alien") species are an example of human-caused disturbance that can have severe impacts on natural biota and ecosystems. Pursuant to Section 4.4.4.2 of the Management Policies, parks are specifically mandated to control exotic species "up to and including eradication" of a population if that species does not meet an identified park purpose; if such control is "prudent and feasible"; if the exotic species interferes with natural processes, disrupts the genetic integrity of native species, damages cultural resources, significantly hampers park management or affects other specified criteria.

Relative to the potential physical effects of barred owl management, the policy states that the National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks, i.e., sounds of animals and physical processes (NPS 2006, p. 56). The National Park Service will protect natural soundscapes from unacceptable impacts by preventing and minimizing unnatural sounds that, through frequency, magnitude, and duration, adversely affect the natural soundscape, or other park resources or values (NPS 2006, p. 56).

Restoration is also an important focus of National Park Service policy. "[T]he National Park Service will use the best available technology to restore the biological components of these systems, accelerating their recovery…Efforts may include removal of exotic species" (NPS 2006, p. 39). Native species are defined as all species that have occurred, now occur, or may occur as a result of natural processes on lands designated as units of the National Park System. Exotic species are those that occupy or could occupy park lands directly or indirectly as the result of deliberate or accidental human activities (NPS 2006, p. 43). The Service has evaluated the situation regarding the potential for barred owls to be considered invasive (Appendix 1). Based on this analysis, we consider the barred owl to be an invasive species present in the West as a result of the indirect effect of human activities, and therefore an exotic species.

The National Park Service relies on natural processes to maintain native animal species whenever possible, however, it may manage individuals or populations when such intervention will not cause unacceptable impacts to populations of species, and when it is necessary to protect rare, threatened, or endangered species. There is precedent for removal of species in National Parks, such as the removal of golden eagles, mule deer, and Roosevelt elk from Channel Islands National, Burmese pythons from Everglades National Park, mountain goats from the Olympic National Park, feral hogs from Great Smoky Mountain National Park, fallow and axis deer from Point Reyes National Seashore, and brown-headed cowbirds from Grand Canyon National Park and Golden Gate National Recreation Area, to name a few.

Visitors use National Parks for a wide variety of recreation including, but not limited to, hiking, camping, scenic viewing, bird watching, skiing, rock and mountain climbing, nature study, and photography. Some activities take visitors into the backcountry, away from roads and developed areas. In the West visitation is generally highest in the summer, dropping off in the fall with the start of school and inclement weather. However, visitors access portions of the parks in all seasons. Most recreation use is concentrated during the daylight hours, except for overnight camping and other limited nighttime uses.

Other Federal Lands

National Monuments are located on Federal lands and are affected by the land management policies and plans of the managing Federal agency in accordance with individual monument Congressional legislation establishing the monument, or Presidential Proclamation through the Antiquities Act. A full range of recreation activities may occur in National Monuments, with the exact allowable uses determined in their establishing legislation or proclamation. Hunting, and in some cases target shooting, may be allowed on these lands. For example, the Columbia River Gorge Scenic Area (under the jurisdiction of the Forest Service), Cascade-Siskiyou National Monument (under the jurisdiction of BLM), and Berryessa Snow Mountain National Monument (under the jurisdiction of BLM) are open for hunting in accordance with State laws.

Recreational activities also take place on other types of Federal lands including National Forests, National Wildlife Refuges, National Recreation Areas, and others. Recreation on these lands include a wide array from hiking and backpacking to recreational vehicle camping and hunting. As in National Parks, some activities take visitors away from roads and developed areas. Because hunting is allowed in most of these areas, the sound of gunshots is part of the background soundscape, at least during hunting season. Barred owl removal could occur at any time of the year but is usually concentrated in the spring and early summer breeding season, and the fall when barred owls are again responsive. Firearm hunting seasons, which are set by the States annually, occur primarily in the fall, with some spring hunting seasons. Target shooting, where not prohibited, may occur at any time of the year. This soundscape includes not only shooting, but traffic noise and many other human sounds in developed areas, and airplane noise, and in some places, all-terrain vehicles.

Hunting on all lands must be in compliance with State regulations. Big game hunting seasons are generally in the fall with some hunting seasons starting in late summer or extending into

the spring. In Oregon there is a spring bear hunt and Washington allows cougar hunting through April. Small mammal hunting seasons may start in mid-summer and extend into early spring, depending on the species. In Oregon, hunting of unprotected mammals is allowed year-round, as are coyotes in Washington. Turkey season runs from fall through spring, end of May in Washington and Oregon, April in California. Wild pig (also known as feral swine) can be hunted year-round in California and Oregon. Therefore, in areas open to hunting, shots may be heard most months of the year, with a concentration during big game hunting in the fall, and a secondary increase in the spring. Target shooting may occur at any time of the year.

Non-Federal Lands

Potential barred owl management areas under the action alternatives include contain non-federal lands (such as State, County, municipal, or private lands) which may or may not allow hunting. Some State or County Parks are managed similar to National Parks, and visitors would not anticipate the sound of gunshots. Other State and county lands are open to hunting and target shooting, making the sound of gunshots part of the background soundscape.

In barred owl management areas where a checkerboard pattern of ownership occurs, non-federal lands are interspersed with Federal lands that are open to hunting, so the sound of gunshots may be heard in many areas of these non-federal lands regardless of whether or not they are open to hunting. On non-federal lands, when hunting is restricted, non-federal landowners often restrict other recreation through posting of no trespassing signs. If these lands are closed to trespassing, then there should be no recreation or visitor use, and therefore no visitors to disturb. For purposes of this discussion, we assumed that all non-federal lands in the range of the northern and California spotted owl are open to hunting and other recreational purposes. We also assumed that recreational visitors could occur throughout these lands, although not to the extent they could be present on National Parks or other Federal lands.

3.6.3 Environmental Consequences

The following sections present the potential environmental effects of the no action alternative, proposed action, and alternatives on recreation and visitor use.

3.6.4 Alternative 1 – No Action

Under Alternative 1, the no action alternative, no systematic barred owl management strategy would be finalized or implemented, and the Service would not obtain a permit for comprehensive management of barred owls. Because there would be no activities on the ground, there would be no effect on recreation or visitor use from barred owl management activities.

3.6.5 Effects Common to All Action Alternatives

Under any action alternative, barred owl removal on management areas would entail the presence of one to three people at sites in the forest for 15 minutes to a few hours, primarily at

dusk or during the night. This could occur at any time of the year, though is usually concentrated in the spring and early summer, and again in the fall, as barred owls are more responsive at these times. Most removal would be conducted from roads, or along trails. Off-trail removal would be very limited due to the danger of traveling off trail in remote areas at night. Lethal removal would involve attracting barred owls with recorded calls and shooting birds that respond and approach closely. This method would result in one to three shots fired during a removal visit. If all birds are not removed in a single visit, or new barred owls reoccupy the site after removal, additional visits and shots may be required, though these would be separated by days or weeks from the initial removal. Removal locations are based on the presence of a territorial barred owl and are likely at least one-half mile or more apart. Barred owls may reoccupy these sites within a single season, therefore one to two additional removals may occur within a single year on some sites.

The intensity of barred owl removal would vary across management areas in the northern and California spotted owl ranges under any alternative. With the exception of the far southern end of the northern spotted owl range, barred owl populations are well established. In these areas, barred owl removal, with associated gunshots, would occur approximately one to four times a year, as new barred owls replace the ones removed. In the southern portion of the northern spotted owl range, and the California spotted owl range, removals would be scattered and intermittent, and not likely to recur in the same area within a year, or even between years.

We anticipate that the primary effect of any of the action alternatives on recreational resources and visitor use is the short-term elevated sound levels resulting from the discharge of a firearm one or two times per removal effort. In areas where hunting or target shooting is not otherwise allowed, this may change the soundscape for recreationists or visitors in the area.

National Parks

All action alternatives include the potential for removal on National Park lands. In parks, we anticipate potential soundscape effects because these areas are open to recreational or visitor use but closed to hunting. Because visitors would not expect to hear gunshots, especially in the interior parts of the park, the sound of gunshots could impact their recreational experience and potentially cause concern and distress for some individuals. It is also possible that some visitors may alter their plans to avoid barred owl management areas.

Use of firearms in the National Parks is not without precedent, as they have been used for ungulate management in Olympic National Park and Point Reyes National Seashore in recent years. Thus, the idea of firearm use for management within National Parks may not be as unexpected as in the past. We do not anticipate that barred owl management would require any specific area closures, however, individual park units may choose to do so out of an abundance of caution. Safety protocols would be in place to ensure that there is no danger to visitors if areas are not closed (Appendix 2) and additional restrictions may be applied by individual units. Individual units may also set standards for removal above that contained in the protocol, including the use of “quiet” guns or other modifications to standard shotguns to reduce noise in areas of high human use and potential conflicts or the option to capture and euthanize barred owls. However, as this would be a local decision, the following analysis assumes removal by a standard 12-gauge shotgun.

Because removal occurs primarily at dusk or night, we anticipate fewer visitors would be exposed to the sound of gunshots than if actions took place during the day, though this still represents a potential effect on the soundscape for those visitors that are in the area.

Other Federal Lands

Most National Forest and BLM-administered lands are open to hunting, and in some cases target shooting. The Bear Valley National Wildlife Refuge in Oregon is forested, lies within the northern spotted owl range and 15-mile buffer, and is open for hunting. Because the sound of gunshots is not unexpected in these areas, we do not anticipate any significant effects on National Forests or BLM-administered lands within barred owl management areas as barred owl removal would not be a significant change in the background soundscape.

The effects in National Monuments managed singularly or jointly by the Forest Service and BLM depend on the individual monument establishing legislation or proclamation. We expect no significant effects in monuments where hunting is allowed or occurs just outside the boundaries. In monuments that are closed to hunting, we expect similar limited effects to those in National Park lands.

Non-Federal Lands

All action alternatives include barred owl management areas containing non-federal lands that may be part of, or adjacent to, the management areas. Where these lands are open to public use (not closed to all uses), hunting is often allowed, and any users would likely be accustomed to the sound of occasional gunshots. Therefore, we expect that barred owl management would have no significant effect on recreation or visitor use on these lands. Where hunting and trespassing is prohibited on these lands, we would also expect no effect because no recreational visitors would be present.

3.6.6 Alternative 2 – Preferred Alternative – Proposed Strategy Implementation

Alternative 2 would include removal of barred owls from management areas across 10 provinces in the range of the northern spotted owl. These would include areas around all recently occupied and newly located spotted owl sites, management of portions of GMAs based on their priority rating, and management on portions of several Special Designated Areas, many of which include National Park lands.

Under this Alternative, barred owl management could occur on all or part of nine National Park or National Park-managed Monument units in the range of the northern spotted owl. These include North Cascades National Park and Ross Lake National Recreation Area, Olympic National Park, and Mount Rainier National Park in Washington; Crater Lake National Park and Oregon Caves National Monument and Preserve in Oregon; and Whiskeytown National Recreation Area, Redwood National Park, Muir Woods National Monument, Golden Gate National Recreation Area, and Point Reyes National Seashore in California. This could involve

barred owl management on up to 1,385,692 acres of forest land within the Parks, as described in Table 3-32. The acres under barred owl management would be a subset of the maximum acres of forest lands within each park and some areas, including populated areas, would be excluded.

Under Alternative 2, barred owl management could occur on all or part of Lassen Volcanic, Sequoia & Kings Canyon and Yosemite National Parks, as well as Devil's Postpile National Monument in the range of the California spotted owl.

Barred owl populations are high within the northern part of the range, resulting in more intensive barred owl removal on management areas within the northern parks. Whiskeytown National Recreation Area, Muir Woods National Monument, and Point Reyes National Seashore currently have lower barred owl densities and would require less removal activity in the initial years of implementation.

Table 3-32. National Parks Lands included in Alternative 2 with the maximum potential forested acres within each National Park unit.

National Park Unit	Physiographic Province/Population	Maximum Acres of Forest Lands within the National Park Unit
North Cascades National Park and Ross Lake National Recreation Area	Western and Eastern Washington Cascades	299,922
Olympic National Park	Olympic Peninsula	698,384
Mount Rainier National Park	Western Washington Cascades	144,751
Crater Lake National Park	Western and Eastern Oregon Cascades	151,403
Oregon Caves National Monument	Oregon Klamath	4,535
Redwood National Park	California Coast	72,999
Whiskeytown National Recreation Area	California Klamath	36,159
Muir Woods National Monument	California Coast	527
Golden Gate National Recreation Area	California Coast	28,703
Point Reyes National Seashore	California Coast	38,898
Lassen Volcanic National Park	Sierra Nevada	94,910
Sequoia & Kings Canyon National Park	Sierra Nevada	367,744
Yosemite National Park	Sierra Nevada	441,682
Devil's Postpile National Monument	Sierra Nevada	719

In the range of the California spotted owls under the Preferred Alternative, all barred owls located on ongoing or future monitoring, inventory, or survey efforts could be removed as soon as practicable after detection across the range of the subspecies and in forest areas representing the potential invasion pathways into the range, including the northern Sierra Nevada area, forested areas in the Central Valley, the forested areas between the Coastal-Southern California population and the Sierra Nevada California spotted owl populations, and in the central coast near the border with the southern end of the California Coast province. Under this alternative, barred owl management could occur on all or part of three National Parks in California, including Lassen Volcanic, Sequoia/Kings Canyon, and Yosemite National Parks. However, as

barred owls would be removed as soon as located, the intensity of disturbance would be significantly lower than in the northern spotted owl range.

Barred owl populations are very low in the Sierra Nevada, including Sequoia & Kings Canyon and Yosemite National Parks. Barred owls are likely to occur more frequently in Lassen Volcanic National Park than in the parks farther south. In all of these parks, removal of barred owls is anticipated to be an occasional event, prompted by the detection of a barred owl within a National Park.

Alternative 2 would result in potential disturbance to visitors in areas where gunshots are not typically heard or expected, such as National Parks, some National Monuments, and State Parks that occur within the barred owl management areas. However, fewer visitors would likely to be exposed to the sound of gunshots during the evening/night hours compared to the total annual visitors using these areas for recreation. On areas where hunting or target shooting are allowed, including Federal, State, and private lands, we anticipate no significant disturbance from the sound of gunshots as these are part of the background soundscape. On areas closed to recreation, no significant effect to recreation would occur. The potential for disturbance to visitors would be greater in the northern spotted owl range. In the California spotted owl range, disturbance would be occasional, intermittent, and widely spaced.

3.6.7 Alternative 3 – Management Across the Range

Alternative 3 would allow for barred owl management to be implemented anywhere within the range of the northern or California spotted owls or within 15 miles of the range of the subspecies (Map 2.6) on up to 50 percent of the area at any one time. For analysis purposes, we assumed that barred owl management would be distributed evenly across the physiographic provinces for the northern spotted owl range, and assumed the 50 percent would be focused largely on the northern portion of the Sierra Nevada. However, individual barred owls could be removed from throughout the Sierra Nevada.

Under this alternative, barred owl management could occur on the same National Park-managed units described in the Preferred Alternative.

Like Alternative 2, Alternative 3 would result in potential disturbance to visitors in areas where gunshots are not typically heard or expected, such as National Parks, some National Monuments, and State Parks that occur within the barred owl management areas. This alternative covers a larger area than other action alternatives, and thus could result in greater disturbance of visitors and visitor use. On areas where hunting or target shooting are allowed, including Federal, State, and private lands, we anticipate no significant disturbance from the sound of gunshots as these are part of the background soundscape. On areas closed to recreation, no significant effect would occur. The potential for disturbance to visitors would be greater in the northern spotted owl range and the associated 15-mile buffer area. In the California spotted owl range and associated 15-mile buffer, disturbance would be occasional, intermittent, and widely spaced.

3.6.8 Alternative 4 – Limited Management by Province/Population

Alternative 4 would allow for barred owl management to be implemented across 100 percent of the highest priority General Management Area or other mapped area in each province within the range of the northern spotted owls (Map 2-7). Under this alternative, barred owl management could include Olympic National Park and Mount Rainier National Park in Washington, and Redwood National Park in California in the northern spotted owl range. This could involve barred owl management on up to 913,892 acres of forest land within the National Park-managed units.

In the California spotted owl range, barred owl management would be delayed until detections reached 10 percent of surveys in areas within the Sierra Nevada portion of the population, or five percent within the Coastal-Southern California portion of the province. Barred owl management could still occur in Lassen Volcanic, Sequoia/Kings Canyon, and Yosemite National Parks. However, barred owl management would not be initiated until detections reached 10 percent. Thus, there would be no soundscape impacts until the 10 percent threshold was reached, but given the larger barred owl population, more barred owls would be removed in a shorter period of time, resulting in greater impacts on the soundscape.

Alternative 4 would result in less potential disturbance to visitors in areas where gunshots are not typically heard or expected, such as National Parks, some National Monuments, and State Parks that occur within the barred owl management areas, due to the smaller acreage and fewer such areas included in the management areas in the range of the northern spotted owl. On areas where hunting or target shooting are allowed, including Federal, State, and private lands, we anticipate no significant disturbance from the sound of gunshots as these are part of the background soundscape.

In the range of the California spotted owls, barred owl removal would be delayed, and barred owl populations allowed to develop prior to removal. By allowing barred owl populations to develop, this alternative would result in a greater potential for disturbance with the increased number of barred owls removed and the resulting increase in gunshots. On areas closed to recreation, no significant effect would occur.

3.6.9 Alternative 5 – Management Focused on Highest Risk Areas

Alternative 5 would focus barred owl management in the northern portion of the northern spotted owl range, where the subspecies is at greatest risk of extirpation from barred owl competition (Map 2-8). Barred owl management could be conducted on 100 percent of two GMAs in the Eastern Washington Cascades, Western Washington Cascades, Eastern Oregon Cascades, Western Oregon Cascades, and Oregon Coast Ranges Physiographic Provinces and one GMA in the Olympic Peninsula Physiographic Province. Under this alternative, barred owl management could include Olympic and Mount Rainier National Parks in Washington and Crater Lake National Park in Oregon. No barred owl management would occur on Oregon Caves National Monument and Preserve in Oregon and Redwood National Park, Muir Woods National Monument, Point Reyes National Seashore in California, and Whiskeytown National Recreation

Area. This could involve barred owl management on up to 944,924 acres of forest land within the Park units. Soundscape impacts would be limited to the northern parks, and within these would be the same as the Preferred Alternative.

In the California spotted owl range, under this alternative, barred owl management would be limited to the northern Sierra Nevada portion of the subspecies range. Barred owl management would only occur on Lassen Volcanic National Park within the California spotted owl range. No barred owl management, and therefore no effect to the soundscape, would occur in Sequoia/Kings Canyon and Yosemite National Parks.

Under Alternative 5, potential disturbance to visitors in the northern spotted owl range would be limited to areas in Washington and portions of Oregon. Barred owl removal would occur in three National Parks. In the California spotted owl range, barred owl removal and the associated disturbance from gunfire, would be limited to a portion of the Sierra Nevada, including only Lassen Volcanic National Park. Thus, this would result in less potential disturbance to visitors in areas where gunshots are not typically heard or expected, such as National Parks, some National Monuments, and State Parks that occur within the barred owl management areas, due to the smaller acreage and fewer such areas included in the management areas.

On areas where hunting or target shooting are allowed, including Federal, State, and private lands, we anticipate no significant disturbance from the sound of gunshots as these are part of the background soundscape.

3.6.10 Alternative 6 – Management Focused on Best Conditions

Alternative 6 would focus barred owl management in the southern portion of the northern spotted owl range, where spotted owl populations have not decreased to the degree they have in the north (Map 2-9). Barred owl management could occur on up to 75 percent of each GMA in the Oregon Klamath, California Coast, California Klamath, and California Cascades provinces. In the California spotted owl range, under this alternative, barred owl management would be focused on areas with the best remaining habitat and areas with higher fire resiliency, including 50 percent of the Sierra Nevada portion of the range with the best remaining habitat, and the 75 percent of the Coastal-Southern California portion of the range.

Under this Alternative, barred owl management could occur on all or part of five National Park or National Park-managed Monument units in the range of the northern spotted owl. These include Oregon Caves National Monument and Preserve in Oregon and Whiskeytown National Recreation Area, Redwood National Pars, Muir Woods National Monument, Golden Gate National Recreation Area, and Point Reyes National Seashore in California. This could involve barred owl management on up to 140,845 acres of forest land within the National Park-managed units.

In the range of the California spotted owl under the Preferred Alternative, barred owl surveys and removals would be concentrated in the best habitat areas with higher fire resiliency. These areas would be determined prior to implementation and could include up to 50 percent of the Sierra Nevada range and 75 percent of the Coastal-Southern California range. Under this

alternative, barred owl management could occur on all or part of three National Parks in California, including Lassen Volcanic, and Sequoia/Kings Canyon, and Yosemite National Parks.

Under Alternative 6, potential disturbance to visitors in the northern spotted owl range would be limited to areas in southern Oregon and California. Barred owl removal would occur in three National Parks. In the California spotted owl range, barred owl removal and the associated disturbance from gunfire, would be limited to a portion of the Sierra Nevada, including only Lassen Volcanic National Park. Thus, this would result in less potential disturbance to visitors in areas where gunshots are not typically heard or expected, such as National Parks, some National Monuments, and State Parks that occur within the barred owl management areas, due to the smaller acreage and fewer such areas included in the management areas.

On areas where hunting or target shooting are allowed, including Federal, State, and private lands, we anticipate no significant disturbance from the sound of gunshots as these are part of the background soundscape.

3.6.11 Summary of Effects by Alternative

Alternative 1, the no action alternative, would have a very limited effect on recreation and visitor use. The primary effect would be the loss of spotted owls, and the opportunity for visitors to observe this species. The primary adverse effect of the action alternatives on recreation and visitor use would be the potential disturbance to users from the sound of gunshots, changing the soundscape. On areas where hunting or target shooting are allowed, we anticipate no significant disturbance from the sound of gunshots, particularly during hunting seasons, as these are part of the background soundscape. On areas where hunting and target shooting are not allowed, the sound of gunshots would adversely affect some users. These areas include most National and State Parks. The primary difference between alternatives would be the number and location of closed areas where barred owl removal would occur, including the National Park units listed in Table 3-33. While implementation of barred owl management is not required under the proposed Strategy or any action alternatives, if the National Park Service choses to implement barred owl management on National Park Lands, all action alternatives would result in potential for a small, temporary, and non-significant effect to recreational use due to the short duration of the disturbance, scattered across the landscape and infrequent in occurrence.

Table 3-33. Summary of National Park administered areas potentially included in each action alternative. "X" indicates National Park units that are at least partially included in potential barred owl management under each alternative; "-" means no lands are included.

	Alternative					
National Park Unit	**1 - no action**	**2**	**3**	**4**	**5**	**6**
North Cascades National Park and Ross Lake National Recreation Area	-	X	X	-	X	-
Olympic National Park	-	X	X	X	X	-
Mount Rainier National Park	-	X	X	X	X	-
Crater Lake National Park	-	X	X	-	X	-

	Alternative					
National Park Unit	**1 - no action**	**2**	**3**	**4**	**5**	**6**
Oregon Caves National Monument	-	X	X	-	-	X
Redwood National Park	-	X	X	X	-	X
Whiskeytown National Recreation Area	-	X	X	-	-	X
Muir Woods National Monument	-	X	X	-	-	X
Point Reyes National Seashore	-	X	X	-	-	X
Golden Gate National Recreation Area	-	X	X	-	-	X
Lassen Volcanic National Park	-	X	X	X	X	X
Yosemite National Park	-	X	X	X	-	X
Sequoia/Kings Canyon National Park	-	X	X	X	-	X
Devil's Postpile National Monument	-	X	X	X	-	X
Total	0	14	14	7	5	10

3.7 Wilderness Areas

Our discussion of the effects of the proposed management of barred owls on Wilderness Areas is focused on the range of the northern and California spotted owls, and adjacent areas described for barred owl management. For each alternative, we considered the effects of barred owl removal and associated activities on designated Wilderness Areas that overlap with the action.

3.7.0 Changes between Draft and Final EIS

- Updated the data tables based on revisions to the alternatives described in Chapter 2.

3.7.1 Background and Analytical Methods

For the purpose of this analysis, and to effectively illuminate differences in the outcomes under the alternatives, we assumed that barred owl management would begin immediately at a maximum of 10 percent implementation in year 1, 50 percent in year 2, and full implementation in year 3 and beyond in the northern spotted owl range. Given the focus on removing all located barred owls and the smaller number involved, we assume full implementation starting in year 1 for the California spotted owl range. The analysis runs for 30 years. This represents two lifespans of spotted and barred owls and allows time to predict and analyze differences between alternatives.

Given the proposed management of barred owls throughout areas in Washington, Oregon, and California, we anticipate that at least some activities associated with the proposed action would occur within designated Wilderness Areas. Wilderness administering agencies must preserve wilderness character, a mandate found in the declaration of policy in the act (16 U.S.C. 1131(a)) and the direction for use of wilderness areas (16 U.S.C. 1133(b)). Roads, motor vehicles, motorized equipment or motorboats, aircraft landing, mechanical transport, or structures or installations are generally prohibited (16 U.S.C. 1133(c)). By policy, Federal land management agencies generally take no actions to diminish wilderness character of

study areas and recommended, proposed, or eligible lands to the extent that action would preclude future wilderness designation (Forest Service Manual 1900, National Park Service Management Policies Chapter 6, Bureau of Land Management Manual 6330).

Wilderness character is defined as a "holistic concept based on the interaction of (1) biophysical environments primarily free from modern human manipulation and impact, (2) personal experiences 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. Taken together, these tangible and intangible values define wilderness character and distinguish wilderness from all other lands" (Landres et al. 2015, p. 7).

Five qualities of wilderness character have been defined to monitor how stewardship actions, impacts from modernization, and other changes occurring inside or outside of a given wilderness area affect the wilderness area over time (Landres et al. 2015, pp. 10-14). These are:

- Untrammeled: Wilderness is essentially unhindered and free from modern human actions that control or manipulate the community of life.
- Natural: Wilderness maintains ecological systems that are substantially free from the effects of modern civilization.
- Undeveloped: Wilderness retains its primeval character and influence and is essentially without permanent improvements or modern human occupation.
- Solitude or Primitive and Unconfined Recreation: Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation.
- Other Features of Value: Wilderness may also contain other features of scientific, educational, scenic, or historical value.

While the alternatives do not compel any particular action, the ESA requires Federal agencies (including those which manage wilderness) to use their legal authorities in the recovery of threatened and endangered species. These wilderness-administering agencies are also charged with varying conservation mandates, and it is reasonable to assume that some barred owl management could occur within designated wilderness and wilderness study areas. Therefore, the analysis includes both a quantitative estimate of how much wilderness area might be impacted, as well as a qualitative analysis of the impacts of each of the alternatives are evaluated for their impact on wilderness character. The qualitative analysis references other portions of the FEIS where necessary to provide greater detail and avoid duplication. The implementation of the alternatives in wilderness would depend on the interest of implementing agencies, so the effects described in this section represent an upper bound to the geographic extent of impacts.

3.7.2 Affected Environment

Areas suggested for barred owl management under various action alternatives include Federal lands designated as wilderness by Congress, as well as areas managed as wilderness by policy by Federal land management agencies (lands recommended, proposed, or deemed eligible for wilderness designation, wilderness study areas). Specific data are provided for designated wilderness and wilderness study areas. Additional lands managed as wilderness by agency policies exist in the analysis area but are unmapped. Within the range of the spotted owls, there

are approximately 9,558,745 acres of designated wilderness and approximately 205,160 acres in of lands managed to preserve eligibility for designation (Table 3-34 and 3-35).

Table 3-34 – Acres of designated wilderness, wilderness study areas, and forested acres within the wilderness in each physiographic province in the northern spotted owl range.

Physiographic Province	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest Habitat in Wilderness
Olympic Peninsula	953,230	0	774,254
Western Washington Cascades	1,740,165	0	1,138,785
Eastern Washington Cascades	1,475,574	15,058	933,386
Oregon Coast Ranges	59,241	7,792	61,754
Western Oregon Cascades	768,131	67,032	752,835
Eastern Oregon Cascades	387,794	69,312	354,881
Oregon Klamath	259,193	208	256,261
California Coast	136,217	6,641	120,414
California Klamath	1,291,826	2,146	1,222,571
California Cascades	48,630	0	22,145
TOTAL	7,120,001	168,189	5,637,286

Table 3-35 – Acres of designated wilderness, wilderness study areas, and forested acres within the wilderness within the range of each California spotted owl population segment.

California Spotted Owl Population	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest Habitat in Wilderness
Sierra Nevada Population	1,323,186	32,959	1,168,510
Coastal-Southern California Population	1,115,558	4,012	931,707
TOTAL	2,438,744	36,971	2,100,217

3.7.3 Environmental Consequences

The following sections present the potential environmental effects of the no action alternative, proposed action, and alternatives on Wilderness Areas, focusing on the wilderness character qualities discussed above. Wilderness and wilderness areas have very specific direction in law, regulations, and agency policies that would need to be addressed in implementation of barred owl management relative to wilderness.

3.7.4 Alternative 1 – No Action Alternative

Under Alternative 1 – No Action, no systematic barred owl management strategy would be finalized or implemented, and the Service would not obtain a permit for management of barred owls, therefore no barred owl removal would occur within wilderness. Therefore, there would be no effect on the untrammeled, undeveloped, solitude or primitive and unconfined recreation, and

other features of value qualities of wilderness. This alternative would have a negative effect on the natural quality of wilderness because native northern and California spotted owl populations would continue to decline or be locally extirpated while barred owls persist or increase in wilderness (see Section 3.4 Affected Environment and Environmental Consequences—Northern and California Spotted Owls). This effect would likely become permanent when spotted owls become extinct.

These impacts could occur on all wilderness in the action area, including up to 9,558,745 acres of designated wilderness and 205,160 acres of wilderness study areas. Under Alternative 1, wilderness character would continue to be adversely affected over the long-term by ever decreasing, and eventually extinction of, spotted owl populations.

3.7.5 Effects Common to All Action Alternatives

The primary mechanism for effects of the action alternatives to wilderness include surveying for and removal of barred owls and post-removal monitoring. All of these actions involve the small crews of two to four individual operating from trails in the wilderness area.

Surveys and barred owl removal would involve the presence of one to three people at specific sites along trails in the forest for 15 minutes to a few hours, primarily at dusk or during the night. This could occur at any time of the year, though it is usually concentrated in the spring and early summer, and again in the fall, as barred owls are more responsive at these times. Weather and access may limit activity in higher elevation areas in the spring. Most removal would be from trails. Off-trail removal would be very limited due to the danger of traveling off trail in remote areas at night. Lethal removal would involve attracting barred owls with recorded calls and shooting birds that respond and approach closely. This method would result in one to three shots fired during a removal visit. If all birds are not removed in a single visit, or new barred owls reoccupy the site after removal, additional visits and shots may be required, though these would be separated by days or weeks from the initial removal. Removal locations are based on the presence of a territorial barred owl and are likely at least one-half mile or more apart. Barred owls may reoccupy these sites within a single season, therefore one to two additional removals may occur within a single year on some sites.

Monitoring would involve small crews placing Autonomous Recording Units (ARUs) along or near trails. Any use of these monitoring installations in wilderness would be subject to approval through a minimum requirements analysis. These small units are placed off trail and out of site of the trail. They would be placed, serviced, and retrieved each year, resulting in three or more visits to the area by the crews.

The intentional manipulation of wildlife populations would result in negative impacts to untrammeled quality. Monitoring installations, if approved, would negatively impact the undeveloped quality. The sights and sounds of modern human activity needed to implement all alternatives, include gunfire, which would negatively impact solitude or primitive and unconfined recreation. Gunfire, particularly outside of hunting season where wilderness is open for hunting, could also affect natural soundscapes, negatively impacting the natural quality. Removal of barred owls is expected to allow for increasing or stable populations of native

northern and spotted owls, which would preserve or improve the natural quality of wilderness (see Section 3.4 Spotted Owls).

These impacts would occur across the areas described in Table 3-36, though removal activity is likely to be focused on areas with trail access. The duration and intensity of barred owl removal would vary depending on the condition of barred owls in the area.

Table 3-36. Expected impacts of barred owl removal on wilderness.

Element of the Action	Expected Impact
manipulation of wildlife populations	negative impact to untrammeled quality
sights and sounds of modern human activity	negative impact to solitude or primitive and unconfined recreation
populations of native species	positive impact to natural quality
populations of non-native species	negative impact to natural quality
unnatural soundscapes	negative impact to natural quality
monitoring installations	negative impact to undeveloped quality

In areas where barred owl populations have been established, survey and removal would occur over multiple years. While we anticipate a reduction in barred owl populations within barred owl management areas as a result of removal, the wide distribution of barred owls within the region would persist.

The California spotted owl range, and Sonoma and Marin Counties in the southern end of the northern spotted owl range, are at the front of the barred owl invasion and barred owls are found in very low numbers. Early detection and rapid response is the most effective management approach along an invasion front. Therefore, the approach to barred owl management in these areas would be to regularly survey or monitor for barred owls and removed them as quickly as possible. While surveying would occur across the years, removal efforts would be low intensity and intermittent.

The location, level, and intensity of these impacts would vary by alternatives.

3.7.6 Alternative 2 – Preferred Alternative – Proposed Strategy Implementation

Alternative 2 would include removal of barred owls from management areas across ten provinces in the range of the northern spotted owl. These would include areas around all recently occupied and newly located spotted owl sites, management of portions of General Management Areas based on their priority rating, and management on portions of several Special Designated Areas (see Chapter 2.3.1). Removal could occur on up to 50 percent of the GMAs, 100 percent of the California Cascades and Marin/Sonoma Management Zones, 10 percent of SOSEAs, and 25 percent of other special designated areas. For analysis purposes, we assumed that the barred owl management would be distributed evenly across the physiographic provinces for the northern spotted owl range.

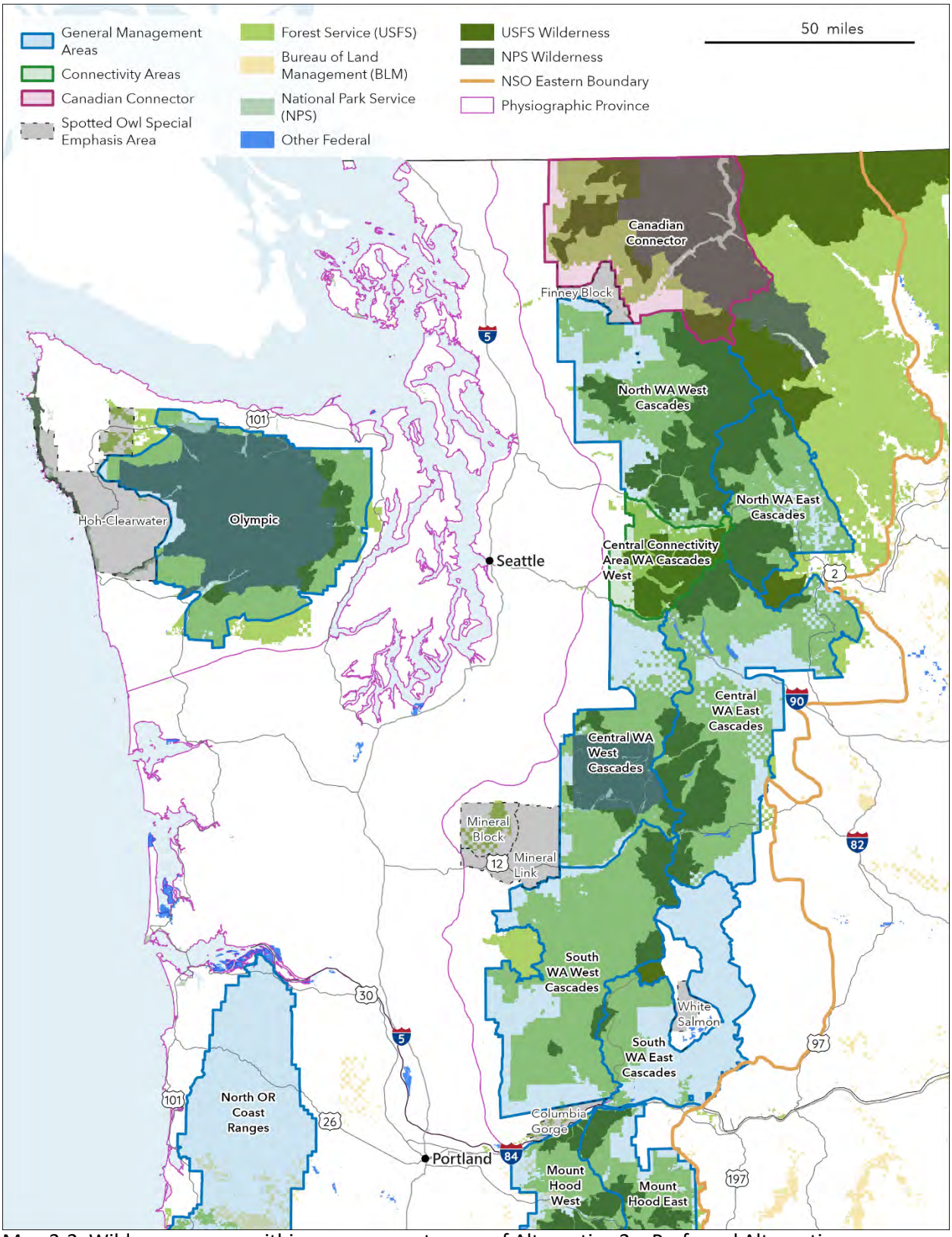
In the range of the California spotted owls, all barred owls located on ongoing or future

monitoring, inventory, or survey efforts would be removed as soon as practicable after detection across the range of the subspecies and in forest areas representing the potential invasion pathways into the range. These pathways include the northern Sierra Nevada area, forested areas in the Central Valley, the forested areas between the Coastal-Southern California population and the Sierra Nevada, and in the central coast near the border with the southern end of the California Coast province. Many of these barred owl management areas include wilderness.

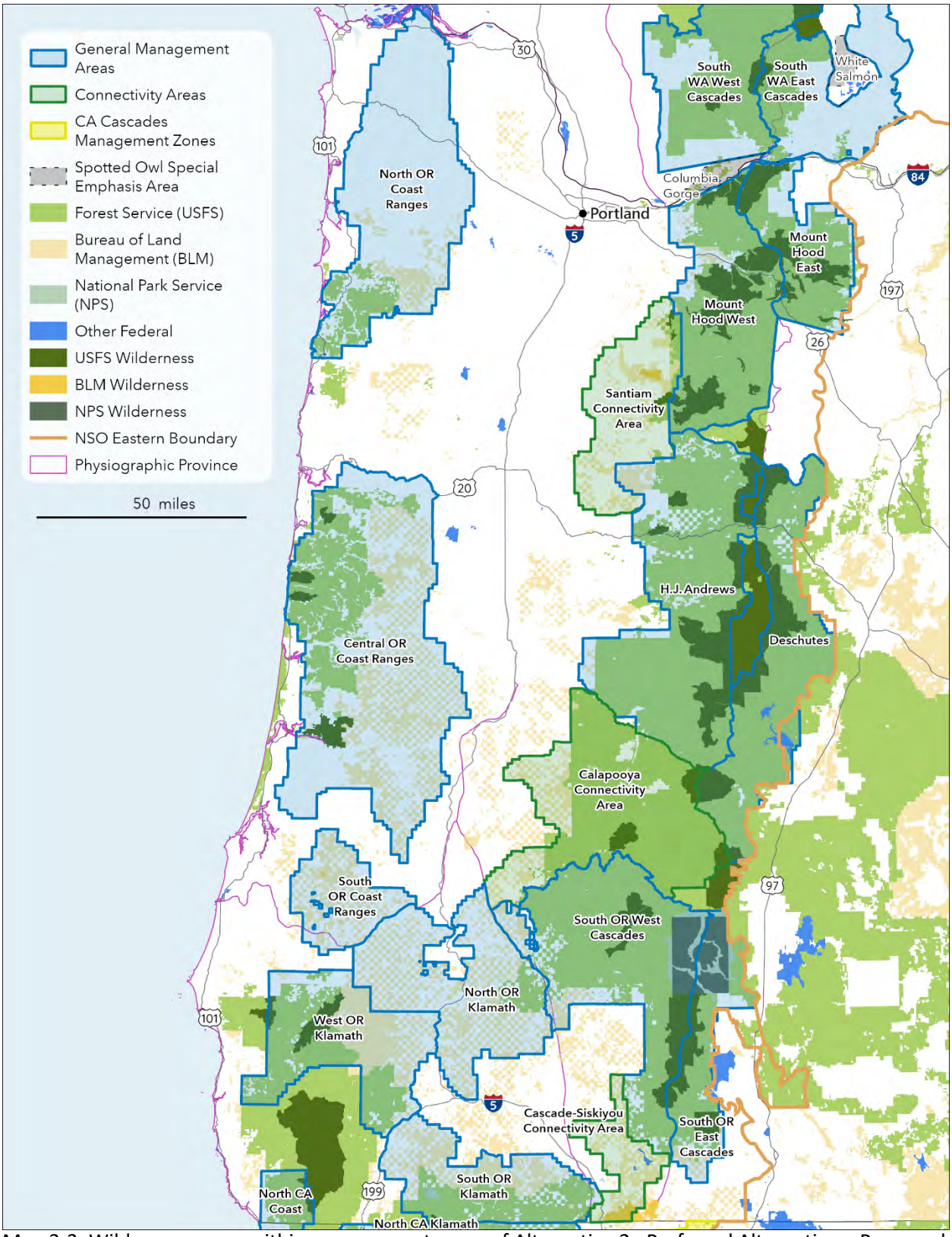
Under Alternative 2 impacts in the northern spotted owl range could occur on approximately 2,585,941 acres of designated wilderness and approximately 76,412 acres of wilderness study areas (Maps 3-2, 3-3, 3-4; Table 3-37) directly involved in barred owl management and additional wilderness outside of barred owl management areas that would potentially be impacted by the loss of northern spotted owls. In the California spotted owl range, Alternative 2 could impact 5,125,813 acres of designated wilderness and approximately 133,011 acres of wilderness study areas (Maps 3-5; Table 3-38) directly involved in barred owl management and additional wilderness outside of barred owl management areas that would potentially be impacted by the loss of northern spotted owls. This would represent 83 percent of the designated wilderness and wilderness study areas within the range of the northern and California spotted owls.

Alternative 2 would have a negative effect on wilderness character on these lands in several ways. The manipulation of wildlife populations through the removal of individual barred owls would negatively affect the untrammeled quality. The sights and sound of modern human activity, including the presence of additional crews on the landscape for survey, removal, and monitoring, would negatively affect solitude or primitive and unconfined recreation quality. The presence of unnatural soundscapes, including gunfire, and the reduction in the population of non-native species would negatively affect natural quality. The placement of ARUs within the wilderness would have a small but negative effect on undeveloped quality. This alternative would have a positive effect on natural quality of wilderness because native northern and California spotted owl populations would stabilize and potentially increase.

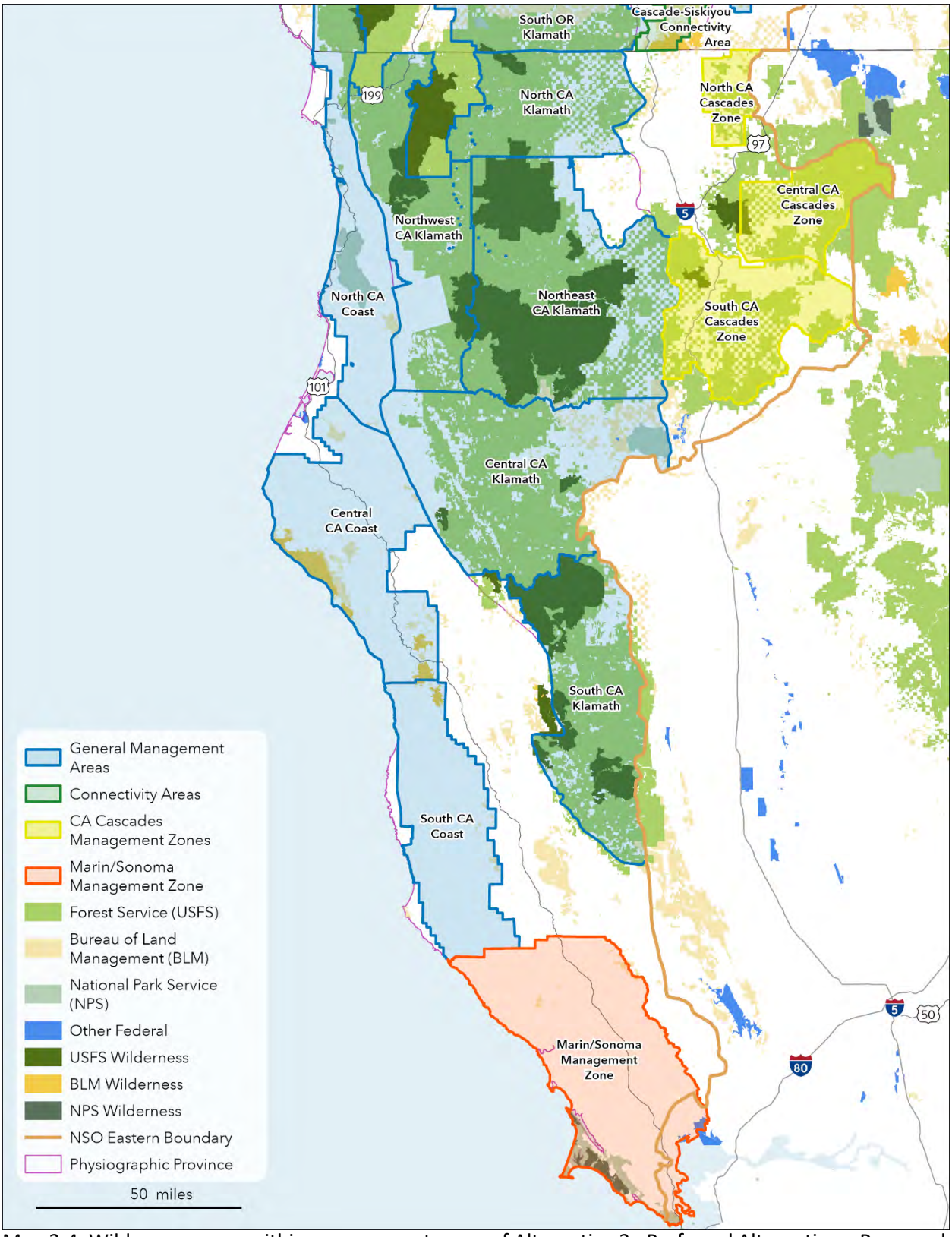
This Alternative would permit barred owl management on the second largest amount of wilderness in the northern spotted owl range, and the largest within the California spotted owl range, compared to the other action alternatives. The overall effect in those areas would be to preserve wilderness character in the long term by preventing the extirpation of a native species in wilderness areas included in Alternative 2. In wilderness where action would not occur, wilderness character would continue to be adversely affected over the long-term by ever decreasing, and eventually extinction of, spotted owl populations.



Map 3-2. Wilderness areas within management areas of Alternative 2 – Preferred Alternative – Proposed Strategy Implementation in Washington.



Map 3-3. Wilderness areas within management areas of Alternative 2– Preferred Alternative – Proposed Strategy Implementation in Oregon.



Map 3-4. Wilderness areas within management areas of Alternative 2– Preferred Alternative – Proposed Strategy Implementation in the northern spotted owl range in California.

Map 3-5. Wilderness areas within management areas of Alternative 2 – Preferred Alternative – Proposed Strategy Implementation in California spotted owl range.

Table 3-37. Maximum area of wilderness potentially under barred owl management by management area in Alternative 2 – Preferred Alternative – Proposed Strategy Implementation, northern spotted owl range.

Physiographic Province	GMA or Special Designated Area Name	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness or Areas Managed for Wilderness Values
Olympic Peninsula	Olympic GMA	461,863	0	373,762
	Olympic Hoh-Clearwater SOSEA	0	0	0
Western WA Cascades	Central WA West Cascades GMA	145,937	0	97,761
	South WA West Cascades GMA	57,503	0	44,653
	North WA West Cascades GMA	231,745	0	168,858
	Canadian Connector	172,259	0	96,006
	Central Connectivity Area Washington Cascades West	42,198	0	30,799
	Finney Block SOSEA	0	0	0
	Mineral Block SOSEA	0	0	0
	Mineral Link SOSEA	0	0	0
	Columbia Gorge SOSEA	0	0	0
Eastern WA Cascades	Central WA East Cascades GMA	154,600	7,226	122,377
	North WA East Cascades GMA	135,095	303	83,492
	South WA East Cascades GMA	4,911	0	4,446
	White Salmon SOSEA	0	0	0
OR Coast Ranges	Central OR Coast Ranges GMA	29,613	0	29,598
	North OR Coast Ranges GMA	0	0	
	South OR Coast Ranges GMA	0	290	290

Physiographic Province	GMA or Special Designated Area Name	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness or Areas Managed for Wilderness Values
Western OR Cascades	H.J Andrews GMA	99,798	0	96,475
	South OR West Cascades GMA	48,921	33,016	76,176
	Mount Hood West GMA	106,605	501	102,567
	Santiam Connectivity Area	4,005	0	3,964
	Calapooya Connectivity Area	11,997	0	11,097
	Cascade-Siskiyou Connectivity Area	3,485	0	3,303
Eastern OR Cascades	South OR East Cascades GMA	37,257	34,656	56,959
	Deschutes GMA	90,162	0	65,735
	Mount Hood East GMA	52,207	0	45,952
OR Klamath	North OR Klamath GMA	0	0	0
	West OR Klamath GMA	25,800	0	25,638
	South OR Klamath GMA	1,895	104	1,995
CA Coast	North CA Coast GMA	4,174	0	4,164
	Central CA Coast GMA	29,821	0	26,886
	South CA Coast GMA	3,844	0	3,838
	Marin/Sonoma County Management Zone	27,361	0	14,079
CA Klamath	Northwest CA Klamath GMA	54,332	0	53,651
	North CA Klamath GMA	14,374	0	13,985
	Central CA Klamath GMA	7,647	0	7,575
	Northeast CA Klamath GMA	357,545	0	335,688
	South CA Klamath GMA	146,965	318	136,045
CA Cascades	South CA Cascades Management Zone	11,079	0	8,831
	North CA Cascades Management Zone	0	0	0
	Central CA Cascades Management Zone	10,950	0	4,066
TOTAL		2,585,941	76,412	2,150,701

Table 3-38. Maximum area of wilderness potentially under barred owl management by California spotted owl population segment in Alternative 2 – Preferred Alternative – Proposed Strategy Implementation, California spotted owl range. Includes wilderness in the invasion pathways.

California Spotted Owl Population	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness and Areas Managed for Wilderness Values
Sierra Nevada CSO Range	1,323,186	32,959	1,168,510
Coastal- Southern California CSO Range	1,115,558	4,012	931,707
Invasion Pathways	2,687,069	96,040	950,155
TOTAL	5,125,813	133,001	3,050,372

3.7.7 Alternative 3 – Management Across the Range

Alternative 3 would allow for barred owl management to be implemented anywhere within the range of the northern or California spotted owls or within 15 miles of the range of the subspecies (Map 2.6) on up to 50 percent of the area. For analysis purposes, we assumed that the barred owl management would be distributed evenly across the physiographic provinces for the northern spotted owl range, and assumed the 50 percent would be focused largely on the northern portion of the Sierra Nevada. Under this alternative, barred owl management would potentially occur in any wilderness within the range of the subspecies and the 15-mile buffer. This includes 3,640,829 acres of designated wilderness and approximately 98,533 acres of wilderness study area in the northern spotted owl range. In the California spotted owl range, barred owl management would potentially occur within 2,634,965 acres of designated wilderness and approximately 22,245 acres of wilderness study area or areas managed as wilderness. This would represent 50 percent of the wilderness and lands managed as wilderness within the range of the northern and California spotted owls and associated 15-mile buffer (Tables 3-39 and 3-40).

Alternative 3 would have a negative effect on wilderness character in several ways. The manipulation of wildlife populations through the removal of individual barred owls would negatively affect the untrammeled quality. The sights and sound of modern human activity, including the presence of additional crews on the landscape for survey, removal, and monitoring, would negatively affect solitude or primitive and unconfined recreation quality. The presence of unnatural soundscapes, including gunfire, and the reduction in the population of non-native species would negatively affect natural quality. The placement of ARUs within the wilderness would have a small but negative effect on undeveloped quality. This alternative would have a positive effect on natural quality of wilderness because native northern and California spotted owl populations would stabilize and potentially increase.

Table 3-39. Maximum area of wilderness by province or population segment potentially under barred owl management in Alternative 3, northern spotted owl range, and 15-mile buffer.

Physiographic Province	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness
Olympic Peninsula	476,615	0	387,127
Western Washington Cascades	870,083	0	569,393
Eastern Washington Cascades	737,787	7,529	466,693
Oregon Coast Ranges	29,621	3,896	30,877
Western Oregon Cascades	384,066	33,516	376,418
Eastern Oregon Cascades	193,897	34,656	177,441
Oregon Klamath	129,597	104	128,131
California Coast	68,109	3,321	60,207
California Klamath	645,913	1,073	611,286
California Cascades	24,315	0	11,073
15-mile Buffer Area	80,826	14,438	56,293
TOTAL	3,640,829	98,533	2,874,936

Table 3-40. Maximum area of wilderness potentially under barred owl management by California spotted owl population segment in Alternative 3.

California Spotted Owl Population	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness
Sierra Nevada	661,593	16,480	584,255
Coastal-Southern California	557,779	2,006	465,854
15-mile Buffer Area	1,415,593	3,759	445,126
TOTAL	2,634,965	22,245	1,495,235

This Alternative would permit barred owl management on the largest amount of wilderness in the northern spotted owl range, and the second lowest within the California spotted owl range, compared to the other action alternatives. Barred owl management could occur on all wilderness within the range of the northern and California spotted owls under this alternative, which contains the largest inclusion of wilderness compared to the other action alternatives. The overall effect would be to preserve wilderness character in the long term by preventing the extirpation of a native species in wilderness areas included in Alternative 3.

3.7.8 Alternative 4 – Limited Management by Province/Population

Alternative 4 would allow for barred owl management to be implemented across 100 percent of the highest priority General Management Area or other mapped area in each province within the range of the northern spotted owl (Map 2-7). In the California spotted owl range, barred owl management would be delayed until detections reached 10 percent of surveys in areas within the Sierra Nevada portion of the population, or 5 percent within the southern California portion of the province. In the northern spotted owl range, this includes 2,092,033 acres of designated wilderness and 14,451 acres of wilderness study areas or areas managed as wilderness (Tables 3-

41). In the California spotted owl range, this includes 2,438,744 acres of designated wilderness and approximately 36,971 acres of wilderness study area or areas managed as wilderness (Table 3-42). This would represent 47 percent of the designated wilderness and wilderness study areas within the range of the northern and California spotted owls.

Table 3-41. Maximum area of wilderness potentially under barred owl management by physiographic province and barred owl management area in Alternative 4 in the northern spotted owl range.

Physiographic Province	GMA or Special Designated Area Name	Acres of Designated Wilderness	Acres Managed for Wilderness values	Acres of Forest in Wilderness
Olympic Peninsula	Olympic GMA	923,726	0	747,524
Western WA Cascades	Central WA West Cascades GMA	291,873	0	195,521
Eastern WA Cascades	Central WA East Cascades GMA	309,200	14,451	244,753
OR Coast Ranges	Central OR Coast Ranges GMA	59,225	0	59,196
Western OR Cascades	H.J Andrews GMA	199,595	0	192,950
Eastern OR Cascades	Deschutes GMA	180,324	0	131,469
OR Klamath	North OR Klamath GMA	0	0	0
CA Coast	North CA Coast GMA	8,347	0	8,327
CA Klamath	Northwest CA Klamath GMA	108,664	0	107,301
CA Cascades	South CA Cascades Management Zone	11,079	0	8,831
TOTAL		2,092,033	14,451	1,695,872

Table 3-42. Maximum area of wilderness potentially under barred owl management by California spotted owl population segment in Alternative 4.

California Spotted Owl Population	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness
Sierra Nevada	1,323,186	32,959	1,168,510
Coastal- Southern California	1,115,558	4,012	931,707
TOTAL	2,438,744	36,971	2,100,217

Alternative 4 would have a negative effect on wilderness character in several ways. The manipulation of wildlife populations through the removal of individual barred owls would negatively affect the untrammeled quality. The sights and sound of modern human activity, including the presence of additional crews on the landscape for survey, removal, and monitoring, would negatively affect solitude or primitive and unconfined recreation quality. The presence of unnatural soundscapes, including gunfire, and the reduction in the population of non-native species would negatively affect natural quality. The placement of ARUs within the wilderness would have a small but negative effect on undeveloped quality. This alternative would have a positive effect on natural quality of wilderness because native northern and California spotted owl populations would stabilize and potentially increase.

This Alternative would permit barred owl management on the second smallest amount of wilderness in the northern spotted owl range, and an intermediate level within the California spotted owl range, compared to the other action alternatives. This Alternative would permit action in less wilderness compared to the other action alternatives. The overall effect in those areas would be to preserve wilderness character in the long term by preventing the extirpation of a native species in wilderness areas included in Alternative 4. In wilderness where action would not occur, wilderness character would continue to be adversely affected over the long-term by ever decreasing, and eventually extinction of, spotted owl populations in these wilderness areas.

3.7.9 Alternative 5 – Management Focused on Highest Risk Areas

Alternative 5 would focus barred owl management in the northern portion of the northern spotted owl range, where the subspecies is at greatest risk of extirpation from barred owl competition (Map 2-8). Barred owl management could be conducted on 100 percent of two GMAs in the Eastern Washington Cascades, Western Washington Cascades, Eastern Oregon Cascades, Western Oregon Cascades, and Oregon Coast Ranges Physiographic Provinces and one GMA in the Olympic Peninsula Physiographic Province. In the California spotted owl range, under this alternative, barred owl management would be limited to the northern Sierra Nevada portion of the subspecies range. In the northern spotted owl range, this includes 2,521,493 acres of designated wilderness and 150,399 acres of wilderness study areas or areas managed as wilderness (Tables 3-43). In the California spotted owl range, this includes 204,848 acres of designated wilderness (Table 3-44). This would represent 29 percent of the designated wilderness and wilderness study areas within the range of the northern and California spotted owls.

Table 3-43. Maximum area of wilderness potentially under barred owl management by barred owl management area in Alternative 5 in the northern spotted owl range.

Physiographic Province	General Management Area	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness
Olympic Peninsula	Olympic	923,726	0	747,524
Western WA Cascades	Central WA West Cascades	291,873	0	195,521
	South WA West Cascades	115,005	0	89,306
Eastern WA Cascades	Central WA East Cascades	309,200	14,451	244,753
	North WA East Cascades	270,189	605	166,983
OR Coast Ranges	Central OR Coast Ranges	59,225	0	59,196
	North OR Coast Ranges	0	0	0
Western OR Cascades	H.J Andrews	199,595	0	192,950
	South OR West Cascades	97,842	66,031	152,351
Eastern OR Cascades	South OR East Cascades	74,514	69,312	113,918
	Deschutes	180,324	0	131,469

Physiographic Province	General Management Area	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness
OR Klamath	none	0	0	0
CA Coast	none	0	0	0
CA Cascades	none	0	0	0
CA Klamath	none	0	0	0
TOTAL		2,521,493	150,399	2,093,971

Table 3-44. Maximum area of wilderness potentially under barred owl management by California spotted owl population segment in Alternative 5.

California Spotted Owl Population	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest Habitat in Wilderness
Sierra Nevada	204,848	0	193,679
Coastal- Southern California	0	0	0
TOTAL	204,848	0	193,679

Alternative 5 would have a negative effect on wilderness character in several ways. The manipulation of wildlife populations through the removal of individual barred owls would negatively affect the untrammeled quality. The sights and sound of modern human activity, including the presence of additional crews on the landscape for survey, removal, and monitoring, would negatively affect solitude or primitive and unconfined recreation quality. The presence of unnatural soundscapes, including gunfire, and the reduction in the population of non-native species would negatively affect natural quality. The placement of ARUs within the wilderness would have a small but negative effect on undeveloped quality. This alternative would have a positive effect on natural quality of wilderness because native northern and California spotted owl populations would stabilize and potentially increase.

This Alternative would permit barred owl management on an intermediate amount of wilderness in the northern spotted owl range, and the lowest within the California spotted owl range, compared to the other action alternatives. This Alternative would permit action in a relatively lower area of wilderness compared to most other action alternatives. The overall effect in those areas would be to preserve wilderness character in the long term by preventing the extirpation of a native species in wilderness areas included in Alternative 5. Within wilderness not included in the alternative, wilderness character would continue to be adversely affected over the long-term by ever decreasing, and eventually extinction of, spotted owl populations in these wilderness areas.

3.7.10 Alternative 6 – Management Focused on Best Conditions

Alternative 6 would focus barred owl management in the southern portion of the northern spotted owl range, where spotted owl populations have not decreased to the degree they have in the north

(Map 2-9). Barred owl management could occur on up to 75 percent of each GMA in the Oregon Klamath, California Coast, California Klamath, and California Cascades provinces. In the California spotted owl range, under this alternative, barred owl management would be focused on areas with the best remaining habitat and areas with higher fire resiliency, including 50 percent of the Sierra Nevada portion of the range with the best remaining habitat, and the 75 percent of the Coastal-Southern California portion of the range. In the northern spotted owl range, this includes 1,342,178 acres of designated wilderness and 843 acres of wilderness study areas or areas managed as wilderness (Tables 3-45). In the California spotted owl range, this includes 2,438,744 acres of designated wilderness areas and 36,971 acres of wilderness study area or areas managed as wilderness (Table 3-46). This would represent 39 percent of the designated wilderness and wilderness study areas within the range of the northern and California spotted owls.

Alternative 6 would have a negative effect on wilderness character in several ways. The manipulation of wildlife populations through the removal of individual barred owls would negatively affect the untrammeled quality. The sights and sound of modern human activity, including the presence of additional crews on the landscape for survey, removal, and monitoring, would negatively affect solitude or primitive and unconfined recreation quality. The presence of unnatural soundscapes, including gunfire, and the reduction in the population of non-native species would negatively affect natural quality. The placement of ARUs within the wilderness would have a small but negative effect on undeveloped quality. This alternative would have a positive effect on natural quality of wilderness because native northern and California spotted owl populations would stabilize and potentially increase.

This Alternative would permit barred owl management in the lowest amount of wilderness in the northern spotted owl range, and an intermediate level within the California spotted owl range, compared to the other action alternatives. The overall effect in those areas would be to preserve wilderness character in the long term by preventing the extirpation of a native species in wilderness areas included in Alternative 6. Within wilderness not included in the alternative, wilderness character would continue to be adversely affected over the long-term by ever decreasing, and eventually extinction of, spotted owl populations in these wilderness areas.

Table 3-45. Maximum area of wilderness potentially under barred owl management by barred owl management area in Alternative 6 in the northern spotted owl range.

Physiographic Province	GMA or Special Designated Area Name	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness
Olympic Peninsula	none	0	0	0
Western WA Cascades	none	0	0	0
Eastern WA Cascades	none	0	0	0
OR Coast Ranges	none	0	0	0
Western OR Cascades	none	0	0	0
Eastern OR Cascades	none	0	0	0

Physiographic Province	GMA or Special Designated Area Name	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest in Wilderness
OR Klamath	North OR Klamath GMA	0	0	0
	West OR Klamath GMA	51,599	0	51,275
	South OR Klamath GMA	3,789	208	3,781
CA Coast	North CA Coast GMA	8,347	0	8,327
	Central CA Coast GMA	59,641	0	53,771
	South CA Coast GMA	7,687	0	7,675
	Marin/Sonoma County Management Zone	27,361	*0*	14,079
CA Klamath	Northwest CA Klamath GMA	108,664	0	107,301
	North CA Klamath GMA	28,748	0	27,970
	Central CA Klamath GMA	15,294	0	15,149
	Northeast CA Klamath GMA	715,090	0	671,375
	South CA Klamath GMA	293,929	635	271,516
CA Cascades	South CA Cascades Management Zone	11,079	0	8,831
	North CA Cascades Management Zone	0	0	0
	Central CA Cascades Management Zone	10,950	0	4,066
TOTAL		1,342,178	843	1,245,116

Table 3-46. Maximum area of wilderness potentially under barred owl management by California spotted owl population segment in Alternative 6.

California Spotted Owl Population	Acres of Designated Wilderness	Acres Managed for Wilderness Values	Acres of Forest Habitat in Wilderness
Sierra Nevada	1,323,186	32,959	1,168,510
Coastal- Southern California	1,115,558	4,012	931,707
TOTAL	2,438,744	36,971	2,100,217

3.7.11 Summary of Effects by Alternative

Table 3-47 displays the potentially affected wilderness for each alternative.

Alternative 1, the no action alternative, would have no effect on the untrammeled, undeveloped, solitude or primitive and unconfined recreation, and other qualities of wilderness, but an adverse effect on the natural quality of wilderness because native northern

and California spotted owl populations would continue to decline or be locally extirpated while barred owls persist or increase in wilderness.

Because barred owls are a forest species, we used acres of forest lands within designated wilderness and wilderness study areas for this summary. This is the acreage on which potential barred owl management activities would occur. All action alternatives would have a positive effect on preserving and protecting the Wilderness character by maintaining an important native predator, the spotted owls. However, barred owl removal would result in temporary, infrequent disturbance that would adversely affect the untrammeled, undeveloped, solitude or primitive and unconfined recreation and other qualities of wilderness. Because these adverse effects would be scattered in time and location and infrequent, we anticipate that barred owl removal in Wilderness would not have a significant effect on that Wilderness.

The potential magnitude of effects, both positive and adverse varies between the alternatives based on the acres of Wilderness on which barred owl management could occur under full implementation. Alternative 3 has the highest potential impacts on wilderness, both positive and negative, as it includes potential barred owl management across all designated wilderness areas and wilderness study areas within the ranges of the northern and California spotted owl and a 15-mile-wide buffer around their respective ranges. Of the action alternatives, Alternative 6 has the lowest area of designated wilderness areas and wilderness study areas in the northern spotted owl range at 22 percent and Alternative 5 has the lowest for the California spotted owl at 10 percent.

Table 3-47. Summary of effects of the alternatives on wilderness.

Wilderness Effects	**Alternative**					
	1 - no action	**2**	**3**	**4**	**5**	**6**
Northern Spotted Owl Range						
Acres of wilderness forest lands within barred owl management areas	0	2,150,701	3,240,384	1,695,872	2,093,971	1,245,116
Percent of designated wilderness forest lands under potential barred owl management areas	0	78%	50%	30%	37%	22%
Distribution of potential barred owl management within designated wilderness in the northern spotted owl range	None	Entire	Entire plus buffer	Entire	North only	South only

Wilderness Effects	Alternative					
	1 - no action	2	3	4	5	6
California Spotted Owl Range						
Acres of wilderness forest lands under potential management	0	3,050,372	1,495,234	2,100,217	193,679	2,100,217
Percent of wilderness forest lands under potential management	0	100%	50%	100%	10%	100%
Distribution of potential barred owl management within designated wilderness in the California spotted owl range	None	Entire	Entire plus buffer	Entire but delayed	Northern Sierra Nevada only	Entire

3.8 Socioeconomics

Our discussion of the effects of the proposed management of barred owls on socioeconomic resources is focused on the range of the northern and California spotted owls, and adjacent areas described for barred owl management where these actions occur. The following documents our evaluation of the potential for barred owl management under the various alternatives to impact timber harvest levels and associated income and employment.

3.8.0 Changes between Draft and Final EIS

- No substantial changes.
-

3.8.1 Background and Analytical Methods

3.8.1.1 Costs of Barred Owl Management

We considered the cost of barred owl management under each alternative. The potential cost of barred owl removal is highly variable. Implementation of any of the alternatives would be spread across many different agencies and entities and over a three-State area. Each entity would have their own approach to staffing, agility to absorb the costs, and internal requirements. The cost of barred owl removal would be heavily dependent on the specific areas chosen for implementation and the conditions of the areas and would vary widely based on size and habitat condition of the implementation area, the staffing approach for removal, vehicle costs and the location of staff in relationship to the barred owl management area, density of barred owls, and accessibility of the

management area.

Barred owl management areas under all alternatives would vary in size, from small blocks around spotted owl sites or barred owl detections to large focal management areas. Barred owl management across larger areas would cost more than smaller areas, but depending on other conditions, could have a lower cost per unit area due to efficiencies gained with size. Because removal would be generally limited to forested areas, barred owl management areas with significant non-forested inclusions would require less work than densely forested management blocks of the same size.

Staffing would be the primary cost component of any barred owl removal. Costs would vary greatly depending on the approach to staffing. Where removal could be done with existing personnel as part of larger work responsibilities, the cost would be lower. Hiring individuals, even seasonal workers, would increase the cost. Contracting would likely increase the cost further. A secondary component of cost would come from vehicle needs. Most barred owl removal would occur at night, and where entities conducted removal with existing staff and existing vehicles costs would be lower than where dedicated crews or contractors needed dedicated vehicles. Vehicle costs would also be affected by the proximity of removal specialists to the removal area.

The density of barred owls would impact the potential cost as well. Where barred owl densities were very low and removal would be focused on detected individual barred owls (e.g., California spotted owl range, Sonoma and Marin Counties), removal over a large area could be accomplished by training existing staff at minimal cost. Where barred owl density was high, removal would require multiple visits per year, increasing the cost for staff and vehicles. The availability of road access would substantially impact the cost of barred owl removal. Where road density was high and roads were easily accessed, individual removal specialists would be able to cover a larger area per night than where road density was lower. In areas where access was limited to trails, the area covered by each removal effort would be lower, but the number of visits per year would likely be lower. Access would also be affected by weather. If barred owl management areas included higher elevation lands, these would remain snowbound into the removal season, shortening the removal period and reducing costs. In general, the removal period for barred owls would range from five to eight months, depending on weather and access.

Given the complexity of factors affecting barred owl removal costs, we did not attempt to estimate costs for each alternative as such estimates would not provide accurate and meaningful information to the public, entities seeking to implement management, or the decisionmaker.

3.8.1.2 Socioeconomic costs-timber harvest

The proposed action, involving management of barred owls, was developed to support conservation of the native spotted owl. The intended outcome of barred owl management is for spotted owl populations to stabilize and increase, recolonizing areas where they have been previously excluded by barred owls. We analyzed the indirect effects of the intended outcome on the economy of the region.

This outcome is unlikely to have any effect on most aspects of the diverse economy of the West Coast (Washington, Oregon, and California), with the possible exception of commercial timber harvest and the revenues, income, and employment associated with that harvest. As stated in Chapter 2.3 and Section 3.8.5, the alternatives in this FEIS do not require any entity to implement barred owl management or change any land management plan or agreements and can generally be applied in concert with existing land management.

Spotted owl colonization of new sites, or the return to areas where they have been previously excluded, could result in a change in the potential forest management of tracts of land in the immediate vicinity of the new or reoccupied site. This is because in general, the take of northern spotted owls is prohibited under Section 9 of the ESA. "Take" includes "harm" which the Service defines to mean "an act which actually kills or injures wildlife" and that can include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." 50 CFR 17.3 ("harm"). Thus, to avoid violating the ESA, non-federal entities conducting timber harvest need to avoid incidental take unless that take is otherwise authorized (for example, via an incidental take permit associated with an HCP or an enhancement of survival permit associated with a Safe Harbor Agreement (SHA) or (per the recently revised 2024 ESA Section 10(a)1 regulations) a Conservation Benefit Agreement (CBA)).

For Federal actions, incidental take is exempted from the section 9 prohibition, as long as the Federal action has undergone section 7 consultation and it does not violate the prohibition under ESA section 7(a)(2) against "jeopardizing" listed species such as the northern spotted owl, which is discussed further below. However, Federal agencies must minimize the impact of any incidental take. Thus, the effect of increasing the number of spotted owl sites on the landscape would reasonably be expected to result in some change to timber harvest on those forests associated with the newly-occupied or reoccupied spotted owl sites if they were previously open to timber harvest. The level and type of effect would depend on ownership, current laws, and management direction. Timber harvest levels could be impacted if, and to the extent that, the presence of reoccupied or new spotted owl sites required changes in timber management under Federal or State laws, regulations, or rules, or as directed in existing management plans.

Any such effects would be small in the near term, because an increase in spotted owl population resulting from the removal of barred owl would likely be slow and occur over a period of years. For entities that manage large forest tracts, including Federal agencies, a rebounding spotted owl population could actually increase flexibility to harvest timber. As discussed further below, this is because the current declines in northern spotted owl populations mean effects of Federal actions on those declining populations are more impactful than they would be in a healthier population, leading to constraints in Federal actions to ensure jeopardy is avoided and incidental take minimized.

To analyze the potential effect of the alternatives on socioeconomic issues, we make the following assumptions.

- We anticipate that spotted owls would reoccupy historical sites once barred owls are removed. These sites have proven their ability to sustain spotted owls in the past, and

based on earlier barred owl removal experiments, are the first places reoccupied by spotted owls when barred owls are removed (Diller et al. 2016, p. 12-13; Hofstadter et al. 2022, p. 282).
- Spotted owls, when recolonizing areas, would choose those with greater levels of habitat (nesting, roosting, and foraging condition) available in the area. In most areas and provinces, these conditions would be generally better on Federal lands (particularly those areas reserved from commercial timber harvest), State lands where timber harvest is constrained, and other areas that are not open for commercial timber harvest.
- We do not anticipate that any landowner or manager would change their management designations as a result of this action. Likewise, this action would not require or assume any changes in Federal or State regulations as a result of implementing this action.

Potential indirect economic effects would be driven by the location of newly occupied or reoccupied spotted owl sites. These effects on commercial timber harvest would occur as a result of complying with the requirements of State-based forest regulations (described in Section 3.8.5 for State and private lands) and avoidance or minimization of take of spotted owls under the ESA as described above. While we can project the likely number of these sites, we cannot identify their specific location. Thus, the analysis of socioeconomic effects is, by necessity, qualitative and descriptive.

3.8.2 Affected Environment

As described in Chapter 3.6, barred owl management under any of the action alternatives could take place on a variety of land ownerships and managements, including Federal, State, Tribal, and other non-federal lands. In this chapter, we focus on lands where timber harvest currently occurs; primarily BLM and Forest Service timberlands, State forest lands, and private lands.

3.8.3 Environmental Consequences

The following sections present the potential environmental effects of the no action alternative, proposed action, and alternatives on socioeconomic conditions.

3.8.4 Alternative 1 – No Action Alternative

Under the no action alternative, barred owl populations would continue to increase and displace northern spotted owls, leading to a continuing steep decline in northern spotted owl populations. This would reasonably be expected to lead to an increase in the need for protection of the remaining occupied spotted owl sites, particularly on Federal lands where agencies have species conservation responsibilities under Section 7(a)(1) of the ESA and a requirement to consult with the Service under 7(a)(2). The need for increased protections would likely be especially pronounced in areas where northern spotted owl populations are already greatly reduced. As increased protections became necessary, this would potentially result in additional limitations on commercial timber harvest in and around occupied spotted owl sites, though the degree, location, and duration of the limitation would be dependent on the specific location, surrounding habitat, population condition, and current management direction of those lands.

For Federal actions, this means timber harvest may be increasingly constrained in the vicinity of the few remaining occupied sites because effects to the remaining individuals carry an outsize impact to the subspecies for consideration in an ESA section 7(a)(2) jeopardy analysis. However, Federal lands, including those managed by the U.S. Forest Service under the Northwest Forest Plan, and BLM-administered lands managed under its Resource Management Plans (RMP), provide significant habitat protection for spotted owls, and so in those areas, the need for protection of remaining individuals may be consistent with existing land management direction. Where northern spotted owl sites remain in protected areas, such as National Parks or land use plan-level reserved areas, no impact on commercial timber harvest would occur. Increased protections would have a greater economic effect on lands currently open for timber harvest and commodity resource uses.

Conversely, on non-federal timberlands, the declining number of northern spotted owls on the landscape would lead to a lower likelihood of incidentally killing or injuring a spotted owl through significant habitat modification, and thus fewer ESA-related restrictions. For fully non-federal actions that are not subject to the jeopardy standard, the potential for effects to commercial timber harvest from occupied spotted owl sites could decline as the number of occupied sites continues to decline.

Thus, under the no action alternative, the effect of northern spotted owl protections on commercial timber harvest and associated socioeconomic impacts to communities through loss of revenue and employment may increase, decrease, or remain the same depending on the location of the remaining spotted owl sites. In Washington and northern Oregon especially, where spotted owl populations have declined to low or very low levels, few occupied spotted owl sites remain.

In the California spotted owl range, continuing invasion of barred owls into the range would lead to declines in spotted owl populations. If the proposed listing was finalized, as populations declined over time, additional restrictions related to ESA compliance would be likely.

Based on the above, we anticipate that there would be a small but non-significant reduction in timber harvest levels under the no action alternative as a result of declining spotted owl populations, which would last until spotted owl populations were extirpated from a particular area for non-federal lands. On Federal lands, existing designations, such as Critical Habitat, would remain in effect until, or unless, they are changed.

3.8.5. Effects Common to All Action Alternatives

The proposed action and alternatives assume ongoing management of lands within barred owl management areas, and do not require landowners or managers to take any specific action. We would not anticipate that any landowner or manager would change their management designations as a result of this action. Likewise, this action would not require or assume any changes in Federal or State regulations.

As explicitly stated in Chapter 2, for all action alternatives, barred owl management would only occur on lands of willing landowners or land managers. We assume that landowners would

evaluate the potential impact on timber harvest as part of their decision to engage in or allow barred owl removal. If there are potential economic impacts of concern to a non-federal landowner or land manager, including effects on timber harvest, resulting from the potential increase in occupied spotted owl sites in barred owl management areas, they could apply to the Service for incidental take authorization under section 10 of the ESA (e.g. an incidental take permit/HCP or enhancement of survival permit/CBA). In areas of mixed ownership, the actions of one landowner may affect neighboring landowners, at least those within the vicinity of the reoccupied spotted owl site.

Potential effects from barred owl management on timber harvest involves two factors: the reasonably foreseeable changes in spotted owl populations resulting from barred owl management and the effect those changes are likely to have on timber harvest.

Spotted owl population growth and reoccupancy

As described in Section 3.4, the likely potential result of barred owl management under any action alternative would be a relatively slow increase in the number of spotted owls within the barred owl management area, and the reoccupancy of spotted owl sites within those management areas that were currently unoccupied due to competition from territorial barred owls. Spotted owl populations would be relatively slow to expand because of their slow reproductive rate and high fledgling mortality. Under each action alternative, this population growth would be limited to areas with barred owl management and where barred owls had previously displaced spotted owls from their territories, resulting in the decline of spotted owl populations. Outside of barred owl management areas, spotted owl populations would be expected to continue to decline as a result of barred owl competition.

Within the barred owl management areas, spotted owls would be most likely to reoccupy sites with the highest quality habitat and avoid marginal sites. On barred owl removal experiments conducted across the range of the northern and California spotted owls, recolonizing spotted owls generally reoccupied past known spotted owl sites. There are insufficient data to allow us to predict specifically where individual spotted owls would settle; however, we can estimate the distribution in relationship to the availability of spotted owl habitat on different landownerships (Table 3-48).

In the range of the California spotted owl, barred owls are at the cusp of invasion and have not yet demonstrably impacted spotted owl populations. As a result, management of barred owls in the California spotted owl range would not likely result in an increase in occupied spotted owl sites and would therefore have no reasonably foreseeable impact on timber harvest. Therefore, the remainder of this analysis is limited to the northern spotted owl range.

Table 3-48. Distribution of northern spotted owl suitable habitat (see definition in Section 3.4.1) by province and land ownership. Spotted owl habitat is derived from the 2024 Cover Type Suitability GIS layer (Davis et al. 2024).

Physiographic Province	Northern Spotted Owl Habitat in Acres	Percent of Northern Spotted Owl Suitable Habitat by Ownership				
		Federal	State	Tribal	Other Government	Private
Olympic Peninsula	847,671	85%	9%	2%	<1%	4%
Western Washington Cascades	1,592,735	84%	9%	<1%	<1%	7%
Eastern Washington Cascades	730,198	74%	7%	9%	<1%	10%
Oregon Coast Range	854,139	65%	13%	1%	1%	20%
Western Oregon Cascades	2,266,430	90%	<1%	1%	<1%	9%
Eastern Oregon Cascades	317,326	83%	1%	10%	1%	5%
Oregon Klamath	1,287,732	76%	1%	<1%	<1%	23%
California Coast	1,145,692	11%	11%	1%	5%	73%
California Klamath	1,566,458	79%	<1%	4%	0%	17%
California Cascades	295,062	58%	1%	0%	<1%	41%
TOTAL	10,903,443	72%	5%	2%	1%	20%

Federal timber harvest under the Endangered Species Act

All Federal agencies are required to consult with the Service (or National Marine Fisheries Service) on actions that may affect a species listed under the ESA, such as northern spotted owls. Consultations are based on the status of the species, the environmental baseline, the effects of the proposed action, and cumulative effects as defined in the ESA. Impacts on individuals of a listed species, including any anticipated take, are part of the effects of the action considered in determining if an action could jeopardize the continued existence of the listed species. "Jeopardize the continued existence" is defined as engaging in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, number, or distribution of that species (50 CFR 402.02). If the Service determines that a Federal action is likely to jeopardize the species, the Service works with the action agency to develop reasonable and prudent alternatives that meet the purpose of the action without jeopardizing the species. Reasonable and prudent alternatives are consistent with the intended purpose of the action, within the scope of the Federal agency's legal authority and jurisdiction, and economically and technologically feasible (50 CFR 402.02).

Although we cannot predict the results of future consultations regarding proposed Federal timber projects, we anticipate that initially, barred owl management would not substantially change the outcome of consultations because the expected increase in spotted owl populations would be

slow. Given the current status of the northern spotted owl, we expect Federal agencies would continue to design timber harvest projects and active management for fire resilience to avoid jeopardizing the species. Over time, as northern spotted owl subpopulations rebound inside barred owl management areas and the resiliency of these individuals and subpopulations increases, we expect Federal agencies may have more flexibility in where and how land is managed, including the potential to expand timber harvest, without the risk of jeopardizing the species.

Federal timber harvest under Federal land management plans

Most spotted owl habitat in the range of the northern spotted owl is found on Federal lands (73% range-wide) (Table 3-48). On Federal lands, any effect on timber harvest from reoccupancy of spotted owl sites would be based on both individual requirements of existing land management plans of the agencies and requirements under the ESA through Section 7 consultation as described above.

Wilderness Areas, National Park lands and National Wildlife Refuges do not have scheduled commercial timber harvest. Thus, changes in spotted owl populations on these lands would not be expected to affect commercial timber harvest and they are eliminated from further discussion.

Oregon BLM's current Northwestern and Coastal Oregon RMP (BLM 2016a) and Southwestern Oregon RMP (BLM 2016b) and associated consultations do not allow the incidental take of spotted owls by timber harvest until the BLM and the Service jointly determine that implementation of a barred owl management program has begun. With the implementation of barred owl management, this prohibition against incidental take would end. However, BLM timber harvest levels are determined by the declared Allowable Sale Quantity and that timber harvest level would not change with the end of the take prohibition. Therefore, there would be no reasonably foreseeable positive or negative impacts on timber harvest levels and associated effects to socioeconomic conditions under Oregon BLM land management plans as a result of spotted owl sites reoccupied following implementation of barred owl management.

In northern California, BLM-administered lands in the range of the northern spotted owl have limited commercial timber harvest. These lands are currently managed under the Northwest Forest Plan as adopted in the Redding and Arcata RMPs (BLM 1993, entire; BLM 1992, entire) which are currently being revised under the Draft Northwest California Integrated RMP (88 FR 67344). No change in forest management would likely occur if new or reoccupied sites were found following barred owl management.

National Forest land use plans do not contain the no-take provision described in the Oregon BLM RMPs. The National Forest plans do contain significant areas managed as reserved areas, including Congressionally designated wilderness and areas managed as late successional reserves, as well as other reserved lands identified at the regional and National Forest level. Late successional reserves have been managed since 1994 for the development of late successional forest, which provides high quality habitat for spotted owls. Thus, these reserved areas generally contain higher quality and density of habitat and are the most likely place for spotted owl reoccupancy of sites within barred owl management areas, with the exception of areas that have

burned in hot, stand-replacing fires within these reserves. While these reserves do not include scheduled timber harvest, timber is occasionally removed, particularly where it is needed to accomplish fire risk reduction or accelerate the development of late successional forest characteristics. Depending on how individual Forest Plans and Late Successional Reserve Assessments incorporate spotted owl habitat protections, it is possible that an increase in occupied spotted owl sites within reserved areas could result in a small and unpredictable potential reduction in commercial timber harvest in these areas.

Scheduled commercial timber harvest on National Forests in the range of the northern spotted owl is primarily restricted to lands allocated as "matrix." The reoccupancy of a spotted owl site in the matrix would not change the overall management allocation in existing plans, though it could lead to changes in how specific areas around these sites would be managed. If spotted owls do reoccupy sites on matrix lands, the potential for effects on timber harvest would depend on individual Forest-level decisions and interagency consultation under the ESA, described below. The level of impact would be dependent on the location and number of reoccupied sites. Based on the slow projected growth of spotted owl populations, and the likelihood of reoccupancy on the reserved areas where lands have been managed to provide high-quality habitat, the number of sites reestablished within matrix lands is likely to be small, leading to a small, but unpredictable, reduction in timber harvest in some alternatives.

State land timber harvest

State lands in Washington contain between seven and nine percent of the remaining spotted owl habitat by province. The State-managed lands that are subject to scheduled timber harvest are managed by the Washington State Department of Natural Resources (WDNR). The WDNR completed the State Trust Lands HCP in 1997. This ecosystem-based forest management plan addresses forest management and other activities on the State trust lands WDNR manages for revenue for the respective Trusts and includes measures for the development and protection of spotted owl habitat. Under this HCP, a small increase in the number of occupied spotted owl sites on these lands would have minimal economic effects on the respective Trusts. The WDNR State Trust Lands HCP is based on providing older forests in various zones to minimize and mitigate the effects of timber harvest to spotted owls and other species utilizing older and more complex forests. The primary potential economic impact of newly reoccupied spotted owl sites would result from a seasonal restriction on timber harvest. This restriction would affect timber harvest within 0.7 miles of active nests during the breeding season on lands defined in the HCP as designated for a conservation role for the spotted owl, and within a 70-acre area around active nests for lands not designated for a spotted owl conservation role. In both cases, the harvest could move forward after the nesting season or following the failure of such active nests. Therefore, the net change in timber harvest and associated economic activity would be minimal. Under Alternative 6, there would be no effect to timber harvest on State lands in Washington, because this alternative does not include barred owl management in Washington.

In Oregon, State lands include 13 percent of the spotted owl habitat in the Oregon Coast Ranges, and 1 percent or less in the other provinces. State lands subject to scheduled timber harvest are managed by the Oregon Department of Forestry (ODF) and Oregon Department of State Lands (ODSL). Under the current land use plans, both agencies avoid take of spotted owls. Depending

on the condition of the landscape, this may, in some cases, result in modification of timber harvest plans and constrain the management of some forest stands within 1.2 to 1.5 miles of the site center depending on the location. This is dependent on the condition of the surrounding lands, the level of habitat available, and the availability of options for timber harvest. Given the low likelihood of a large increase in the spotted owl population and the ability of the agencies to adjust harvest across their relatively large ownership to accommodate the slow increase in spotted owl sites, we would expect only minor potential reductions in timber harvest on Oregon State lands should they implement barred owl management. In addition, ODF and ODSL have prepared proposed HCPs in support of an application for an incidental take permit from the Service (and the National Marine Fisheries Service) for its forest management activities. If the Service ultimately issued an incidental take permit, this would address forest management in spotted owl sites on ODF and ODSL lands. In this case, depending on the details of the final HCP and the incidental take permit, it is possible that increases in the number of occupied spotted owl sites on State lands, resulting from implementation of any of the action alternatives, would not result in any change to timber harvest levels.

In California, State lands contain from less than 1 percent to 11 percent of the spotted owl habitat in the provinces. The primary State lands subject to scheduled timber harvest in the northern spotted owl range are in the Jackson State Demonstration Forest, managed by the California Department of Forestry and Fire Protection (Cal FIRE). Potential habitat is surveyed prior to timber harvest and any spotted owl sites are protected. Once sites are established, site-specific management continues, even if the site becomes unoccupied. Given that displaced spotted owls would most likely reoccupy former sites that were cleared of barred owls in areas under barred owl management, and these known spotted owl sites are managed as if occupied, barred owl management under any of the action alternatives would not likely lead to a reduction in timber harvest on these lands. Some timber is removed at times from California State Parks and California Department of Fish and Wildlife lands as part of management for fire protection, improving fire resiliency, and restoring forests, to which the same forest practices management applies. Therefore, we would not expect any of the action alternatives to result in any reduction in timber harvest on these lands, either.

Private land timber harvest

Under the Federal ESA, take of northern spotted owls is prohibited for private individuals, unless it is authorized under section 10 of the ESA (for example, through an (incidental take permit/HCP or enhancement of survival permit/CBA). Take of northern spotted owls includes activities which actually kill or injure a northern spotted owl by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. This impairment can be a result of significant habitat modification or degradation.

As noted above, we anticipate that spotted owls would reoccupy sites with the best remaining habitat. As Table 3-48 demonstrates, with the exception of the California Coast province, where 72 percent of the spotted owl habitat is found on private lands, the majority of suitable habitat is on Federal lands. In the California Cascades, Oregon Klamath, California Klamath, and Oregon Coast Ranges provinces, between 17 and 41 percent of the spotted owl habitat is found on private lands. In all other provinces, 10 percent or less of spotted owl habitat is found on private

lands. Outside of the California Coast province, we anticipate that as spotted owls reoccupied sites where barred owls had been removed, under any of the action alternatives, most of these sites would not have their core areas on private lands. This would especially be true in all provinces in Washington and in the Eastern Oregon Cascades and Western Oregon Cascades provinces, as these are the provinces where private lands encompass less than 10 percent of all spotted owl habitat.

Impacts to private timber harvest from spotted owl reoccupation on private lands would be dependent on many factors, including how individual lands are managed for timber harvest or other uses, State and local regulations, and the conditions of any incidental take permits in the landowner's possession, as well as the distribution and quality of habitat on private lands and any neighboring public lands.

Washington State designated Spotted Owl Special Emphasis Areas (SOSEAs) for demographic and dispersal support of Federal spotted owl management efforts. State regulations related to the protection of spotted owl sites are tied to these SOSEAs. Within SOSEAs, spotted owl sites (known as of July 1, 1996, when the regulations went into effect) continue to be protected (WAC 222-10-041(4)). If spotted owls reoccupied these site centers, there would be no effect on private timber harvest. If spotted owls returned to a site but used a significantly different core areas within the site, the circle defining the area of protection would be shifted, potentially including previously unencumbered lands but also freeing up a comparable amount of land (Buchanan and Swedeen 2005). Given that the released lands would have been protected, it is likely that they would have comparable, if not greater, timber value than the newly protected lands. A totally new site would potentially encumber some timber lands, though the likelihood that habitat remains sufficient to attract a spotted owl outside of currently protected sites is very low. It is much more likely that any new spotted owls would settle on the previously protected sites. Spotted owl sites outside of SOSEAs receive limited protection only during the nesting season (between March 1 and August 31) (WAC 222-10-041(5)), but these areas are for the most part not included in mapped barred owl management areas, and even where they are included, are unlikely to retain sufficient habitat to attract spotted owls. Still, there would be potential for a small, but unpredictable, positive or negative impact on timber harvest in alternatives that include Washington provinces (that is, all action alternatives except for Alternative 6).

Oregon Forest Practices Rules protect spotted owls in three ways that may affect private timber harvest: the 70-acre protected area for occupied spotted owl nesting sites, including the area within the vicinity of a nest tree, and seasonal restrictions near active spotted owl sites (see OAR 629-665-0210). Where the nest tree has not been located, the criteria for designation of these 70-acre protected areas include repeated observations of a spotted owl pair and list of features characteristic of high-quality nesting habitat. This often results in the 70-acre areas being designated primarily on adjacent Federal or State land. However, if spotted owl site centers occur on private lands, or along the boundary between private and public lands, and these lands contain spotted owl habitat, some area of private lands may be included in the protected 70-acre core. This is more likely to happen with checkerboard ownership of public and private lands. Finally, seasonal restrictions may be required near spotted owl nest sites between March 1 and September 30. These may be lifted if surveys show that spotted owls are not nesting on the site.

As noted above, we anticipate that spotted owls would reoccupy sites with the best remaining habitat. Based on prior experience analyzing spotted owl site locations in Oregon checkerboard landscapes, most of the known, previously occupied, spotted owl site centers, along with the majority of high-quality spotted owl habitat, is found on Federal or State lands. However, with the Oregon Coast Range and Oregon Klamath provinces, 21 and 23 percent respectively of suitable habitat is found on private lands. In addition, these provinces contain a large proportion of checkerboard lands. As noted in Chapter 3.4, the growth of spotted owl populations, even with barred owl management, would be slow and the total number of new sites would be low in comparison to the area of these provinces and the availability of habitat on Federal and State lands. Given the potential for reoccupancy of sites to occur near or on private lands with spotted owl habitat, we anticipate there would be a small, but unpredictable, impact on private timber harvest as a result of the action alternatives, particularly in the Oregon Coast Range and Oregon Klamath provinces.

California regulations require Timber Harvest Plans for timber harvest on private lands (see 14 California Code of Regulations 1032.7). This includes surveys of all potential habitat for two years prior to timber harvest. Spotted owl sites located on these surveys are entered into the State's database. Take avoidance is required for all spotted owl sites entered in the State's database, past and present. Thus, the majority of historical and current activity centers in California are afforded protection under California Forest Practices Rules and other guidance. Given that displaced spotted owls are most likely to reoccupy former sites when cleared of barred owls in areas under barred owl management, and most of these known spotted owl sites are currently managed as if occupied, barred owl management would not lead to a reduction in timber harvest in areas where past or present spotted owl sites are known. Reductions in timber harvest would only occur where spotted owls occupied new sites that have not previously been documented. With barred owl management under any of the action alternatives (except for Alternative 5), we would expect spotted owl populations to increase in California, and this could potentially lead to new sites being discovered more often than they are now. We expect that the majority of spotted owl population growth would not be associated with new sites.

There are three HCPs covering northern spotted owls in California, with incidental take permits held by Green Diamond Resources Company, Sierra Pacific Industries, and Humboldt Redwood Company. Green Diamond Resources Company and Sierra Pacific Industries HCPs include barred owl removal studies. In all cases, spotted owls reoccupying sites under these HCPs would not affect timber harvest on these lands. The Green Diamond Resources Company and Humboldt Redwood Company HCPs are in the California Coast province. We do not anticipate reductions in timber harvest on lands under these HCPs would result from implementation of any of the action alternatives. On other private timberlands in the California portion of the northern spotted owl range, we do anticipate a very small, but unpredictable, potential reduction in timber harvest as a result of alternatives that include actions in the California provinces (all action alternatives except for Alternative 5).

3.8.6. Summary of Effects of the Alternatives on Socioeconomics

The potential for socioeconomic effects of the alternatives would be driven by the overlap of barred owl management, spotted owl site occupancy increases on management areas, and the distribution of spotted owl habitat within the provinces (Table 3-49).

Table 3-49. Comparison of the effects of the alternatives on spotted owls.

Physiographic Province	Increase in Number of Spotted Owl Sites at year 30 on Managed Areas by Alternative						Percent Spotted Owl Habitat by Province		
	1	2	3	4	5	6	Federal	State	Private
Olympic Peninsula	0	5	3	2	2	0	85%	9%	4%
Western Washington Cascades	0	9	4	1	3	0	84%	9%	7%
Eastern Washington Cascades	0	3	1	1	1	0	75%	8%	10%
Oregon Coast Ranges	0	21	10	7	11	0	65%	13%	20%
Western Oregon Cascades	0	50	25	12	18	0	89%	1%	9%
Eastern Oregon Cascades	0	9	5	1	5	0	83%	<1%	5%
Oregon Klamath	0	35	17	12	0	14	76%	1%	22%
California Coast	0	214	107	41	0	94	11%	11%	72%
California Klamath	0	131	65	30	0	90	79%	<1%	17%
California Cascades	0	9	4	12	0	45	58%	1%	41%
TOTAL	0	486	241	119	40	243	73%	5%	20%

The projected increases in spotted owl site occupancy would likely be slow in most areas, with the possible exception of areas of northern California with low current barred owl populations. Increases in spotted owl site occupancy would also likely occur where high quality habitat was available. Such habitat is concentrated on Federal lands in most provinces, and often within reserved areas on these lands.

On Federal lands, new sites would be managed according to existing land management plans and land designations, subject to Section 7 consultation. Given the slow projected increase in spotted owl sites under barred owl management, the preponderance of habitat occurring on lands not subject to scheduled timber harvest under current plans, and the history of Federal land management and consultation, we do not anticipate that any of the action alternatives would significantly affect regional timber harvest levels. On State lands, existing land management plans and current HCPs greatly reduce the potential for conflict between timber production and reoccupied spotted owl sites.

The potential for the estimated increase in spotted owl site occupancy/reoccupancy to reduce timber harvest levels and associated income and employment in the Washington provinces would be very low to negligibly small across all action alternatives, due to the low projected increase in

spotted owl occupied sites and the high percentage of spotted owl habitat on Federal lands, including large areas of reserved lands. There would be no impact to timber harvest levels in Washington from implementation of Alternative 6, because this alternative does not include barred owl management in Washington.

In Oregon, the potential for reductions in timber harvest levels and associated income and employment would be generally low due to the low level of increase in in spotted owl occupied sites and the high percentage of spotted owl habitat on Federal lands, including large areas of reserved lands. The potential for some spotted owl sites to impact private land timber harvest would be slightly higher in Alternatives 2 and 4 in the Oregon Coast Ranges province and Alternatives 2 and 6 in the Oregon Klamath province. The limited requirements for management around spotted owl sites under Oregon Forest Practices Rules would reduce the potential impact to a very low level.

In northern California, a substantially higher percentage of spotted owl habitat is found on private timberlands. On lands included in HCPs with coverage for spotted owls, we anticipate no change in timber harvest levels under any barred owl management alternative. All potential habitat on State and private timberlands is surveyed for at least two years prior to timber harvest and any spotted owl sites are protected according to the California Forest Practices Rules (California Code of Regulations Title 14). Once sites are established, site-specific management continues, even if the site becomes unoccupied.

The majority of historical and current activity centers in California are afforded protection under California Forest Practices Rules and other guidance, and we anticipate that there would be no change in timber harvest levels as a result of spotted owls reoccupying these sites with barred owl management under any alternative. While we anticipate that most spotted owl reoccupancy resulting from barred owl management would occur on historical activity centers, some new sites could be established in areas where spotted owls had not been previously documented. These sites would be covered by California Forest Practices Rules which would likely result in changes to timber harvest plans around these sites. Therefore, there would be a potential for small reductions in timber harvest on private lands in California, but this potential would be limited to situations where spotted owls occupied sites where they were never previously documented.

No barred owl management activity would occur under the no action alternative, and the resulting declining spotted owl populations would likely result in a small but not significant reduction in timber harvest levels. Barred owl management, resulting in an increase in occupied spotted owl sites, could have a small, indirect effect on timber harvest in Washington, Oregon and northern California, and the revenues, income, and employment associated with that harvest. None of the action alternatives require any entity to implement barred owl management or change any land management plan or agreements, and barred owl management can generally be applied in concert with existing land management. The potential for small reductions in private land timber harvest would be greatest in Alternative 2, specifically in the California Coast province, given the larger increase in occupied/reoccupied spotted owl sites and spotted owl habitat on private lands. It would be smallest in Alternative 5 in northern California, where no barred owl management would occur. Based on the existing Federal and State land use plans, HCPs, and State forestry regulations, we anticipate that the small potential reduction in timber

harvest resulting for the slow increase in spotted owl occupied sites would not result in a significant effect to the local or regional economies.

3.9 Climate Change

This section presents a summary of the potential effects of climate change on environmental resources affected by the proposed action and alternatives, including spotted owls. It also briefly discusses how climate change could affect each alternative and its environmental impacts, as well as the potential effects or contribution of the action alternatives to global climate change.

3.9.0 Changes between Draft and Final EIS

- No substantial changes.
-

3.9.1. Background and Analytical Methods

The CEQ recommends agencies address climate change impacts and energy requirements by considering both the effects of climate change on a proposed action and its environmental impacts, but also the potential effects of the proposed action on climate change as indicated by changes in greenhouse gas (GHG) emissions. The CEQ recommends a "rule of reason" and the concept of proportionality caution against providing an in-depth analysis of emissions regardless of the insignificance of the quantity of GHG emissions that the proposed action would cause. Given the nature of the proposed action and alternatives analyzed in this FEIS, the negligibly small contribution of additional GHG emissions and energy requirements associated with any of the alternatives, and the data available, the Service determined that a quantitative analysis of GHG emissions was not appropriate.

3.9.2 Affected Environment

Scientific measurements spanning several decades demonstrate that changes in climate are occurring and that the rate of change has been faster since the 1950s. There is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of greenhouse gas emissions. A recent comprehensive assessment (Domke et al. 2023, entire) indicate that climate change will have long-term and variable impacts on forest habitat at local and regional scales.

Climate change is occurring within the northern and California spotted owls' entire range, the analysis area of this FEIS. Given the wide geographic range and the sensitivity of climate change to local conditions, projected changes in climate vary across the analysis area, and the effects those changes on species and habitats vary. However, there are underlying trends that apply across the area. Projected continuing changes in climate in the West would result in increasing temperatures over time and changes in precipitation amount, timing, and distribution. Regional warming and consequent drought stress appear to be the most likely drivers of an increase in the mortality rate of trees in recent decades in the western United States. This, in turn, leads to increased fire risk and high severity fires; increased risks from forest pathogens; and changes in forest structure, extent, and species composition. While the rate and impact of these changes may

differ between forest types and with local microclimates, the overall potential for these effects throughout the range remains.

Climate change has affected, or is starting to affect spotted owls through change in habitat throughout their range (USFWS 2020, section 4.3.2; USFWS 2023b, Section 4.4). Climate change forecasts indicate continuing and significant future effects on western forests over the next century, with long-term implications for the composition and structure of those forests for spotted owl habitat. These changes in the climate and forest ecosystems in the West are likely to cause additional direct and indirect stressors for northern and California spotted owls. Changing climatic conditions may have direct impacts on spotted owl physiology, survival, reproduction, recruitment, or population growth through heat stress from extended high temperatures and indirect impacts including changes in habitat and prey distribution, abundance, and quality. Several northern spotted owl demographic study analyses noted associations between northern spotted owl demographic rates and climate suggesting predicted climate change is likely to have negative consequences for northern spotted owls, although the magnitude of these potential impacts is unknown. Habitat loss (Dugger et al. 2016, p. 98), competition with barred owls (Wiens et al. 2014, p. 37), and changes in weather patterns predicted to occur in future decades (Glenn et al. 2010, pp. 2549-2551) have independently been demonstrated to have negative effects on northern spotted owl populations. In combination, these factors are likely to interact and have even greater negative consequences for this subspecies. For more detail on climate change and spotted owls, see USFWS 2023b, Section 4.4; USFWS 2020, Section 4.3.2.

3.9.3 Environmental Consequences

Alternative 1, the no action alternative, would have no effect on climate change, as no comprehensive management actions would be conducted that could contribute GHG emissions.

Under all action alternatives, the primary potential effect on climate change is GHG emissions associated with the use of motorized vehicles for the survey and removal of barred owls. Under all action alternatives these actions would be conducted as part of ongoing forest or land management activities, which already involve the use of vehicles as needed. Vehicle use for barred owl removal is relatively low intensity. Barred owl removal in well-roaded areas would involve use of a vehicle to access multiple barred owl sites per night, covering as much as 3,000 acres per night and repeating this effort three or four times per year per area. Removal in unroaded areas would require vehicle use to access trailheads. Removal would likely occur over six to eight months each year. The addition of barred owl management is not anticipated to significantly increase the vehicle use in management areas beyond the normal variation associated with forest management, and thus increases in vehicle emissions would be very low. Overall, any effects on regional greenhouse gas emissions or global climate change resulting from the proposed alternatives would be negligibly small. Thus, the Service has not attempted to conduct an in-depth or quantitative analysis of effects of the action alternatives on global climate change.

In Section 3.8 we concluded that there is the potential for a small, but unpredictable, reduction in timber harvest under all alternatives (including the no action alternative), and thus we did not attempt to analyze how potential changes in future forest management activities across

different land ownerships would result in subsequent changes in GHG emissions, carbon sequestration, or overall contributions to global climate change.

3.10 Other Resource Issues Dismissed from Detailed Analysis

A number of resources issues identified during scoping were considered but then dismissed from detailed analysis for the reasons described below, either because there are not likely to be significant effects from the proposed action or alternatives, or where effects do not differ between the no action and action alternatives (i.e., that the proposed action or its alternatives make no difference). We dismissed these from detailed analysis in order to focus on those consequences that are most significant, of greatest concern to the public, and of greatest relevance to the agency's decision.

3.10.0 Changes between Draft and Final EIS

- No substantial changes to Public Health and Safety, Cultural Resources, Ethical Considerations, Environmental Justice, Geology, Soils, Water, Vegetation, and Air Sections.
- Updated information on communication with Tribes in Impact to Tribes Section.

3.10.1 Public Health and Safety

Under the no action alternative, no removal would occur, thus there are no public safety issues.

As to the action alternatives, the use of firearms for the removal of barred owls presents potential public safety issues. To avoid safety issues, under all action alternatives all lethal removal of barred owls would be undertaken pursuant to a strict protocol that includes elements to protect human health and safety (See Appendix 2 for details). Removal would be authorized only if conducted by trained, authorized professionals, and would not be part of a public hunting effort. The protocol includes a minimum no-shooting buffer zone of one quarter mile around occupied dwellings, established open campgrounds, and other locations with regular human use. Prior to and during removals, the area would be assessed for potential human presence (homes, tents, vehicles) and appropriate buffers applied. Removal would conform to any additional safety requirements of participating landowners or land managers. Based on these requirements, which apply to all alternatives, there is no risk of gunshot injury to humans.

Safety of crews conducting barred owl removal, particularly in unroaded areas, is important. Ultimately the implementing entities are responsible for ensuring basic safety and responding to specific concerns from land management agencies about particular areas or conditions where removal would take place.

Various barred owl removal studies have applied this basic protocol since 2009 across all three States. There have been no safety issues for crews or the public during the removal of over 4,500 barred owls during that period. Public safety considerations do not vary significantly

across all alternatives, i.e., public safety is a priority across all action alternatives. Therefore, this topic was dismissed from further detailed analysis of environmental consequences as safety protocols would be employed for all of them, which would ensure that there is no potential for significant effects to public safety.

3.10.2 Cultural Resources

For purposes of this document, cultural resources are defined as archaeological resources, buildings, structures, districts, objects, and traditionally important places on the landscape. These resources may be historic properties as defined in 36 Code of Federal Regulations (CFR) Part 800, listed on a State or local historic register, or identified as being important to a particular group.

As a Federal agency, the Service is responsible for complying with laws and regulations designed to protect cultural resources. In general, these efforts focus on the protection of historic and prehistoric artifacts, structures, and landscapes through compliance with section 106 of the National Historic Preservation Act of 1966. Under section 106, the Service must determine whether a proposed action meets the definition of an undertaking that could result in changes in the character or use of historic resources (i.e., districts, sites, structures, or objects) that are eligible for listing on the National Register of Historic Places. The issuance of a Federal permit is an undertaking as defined by the National Historic Preservation Act that triggers consideration of section 106 review.

We conclude that the proposed action has no potential to cause effects, because the proposed action, along with all action alternatives, does not involve any ground disturbing or other activities that might result in direct or indirect effects to known or potential cultural resources. Under all alternatives, the rights reserved by Native Americans in existing treaties and statutes, and access to those areas where said rights are exercised, would remain unchanged. Therefore, this topic was dismissed from further detailed analysis of environmental consequences.

3.10.3. Impacts to Tribes

In additional to extensive general outreach during scoping, the Service reached out directly to Native American Tribes potentially affected by the proposed action and action alternatives. The Service recognizes that each Federally recognized Tribe is unique and sovereign and may have different treaties and other agreements with the United States (USFWS 2016, p. 1). The Service has sought and continues to seek involvement of the Tribes to gain understanding of the Tribes' perspective on potential impacts of the proposed action and alternatives and Tribal management of the resources that may be affected.

The Service is responsible for protecting and complying with the treaty rights and statutes that concern Native American Tribes. This includes the American Indian Religious Freedom Act of 1978, which protects the Native American right to practice religious beliefs.

As part of the ongoing commitment to government-to-government relations with Native American Tribal Governments, the Service sent a scoping letter to all Tribal decision makers of

Native American groups potentially affected by the proposed action in Washington, Oregon, and California in November 2020. The purpose of the scoping letter was to reaffirm the Service's intention to work cooperatively with affected and interested Tribes, and to seek Tribal participation in development of the proposed Strategy. The Yakama Nation provided a biologist who has served on the Barred Owl Management Strategy Core Development Team from its inception.

In January 2022, the Service invited all Tribes in Washington, Oregon, and California to participate as cooperating agencies on this EIS. Several Tribes reached out for additional information, but chose not to serve as a cooperating agency. With the publication of the Notice of Intent to Prepare an EIS on July 22, 2022, the Service again reached out to the Tribes to ensure they were aware of this opportunity to provide information for the EIS and conducted a virtual meeting with the interested Tribes.

In March 2023, the Service reached out to the Tribes to offer consultation on the draft Strategy and to offer inclusion in the voluntary Strategy relative to Tribal lands. The Service hosted two virtual informational meeting for the Tribes on May 1 and May 4, 2023. We provided background information on the draft Strategy and further information on the option to include Tribal lands. Following the meetings, we responded to direct questions from several Tribes. The Hoopa Valley and Yurok Tribes requested inclusion of their lands in northern California and the Yakama Nation requested inclusion of a portion of their lands in the Eastern Washington Cascades within barred owl management areas for the Strategy.

Following release of the DEIS and draft Strategy, the Service reached out to Tribes in Washington, Oregon, and California, and provided further information in a virtual meeting on December 11, 2023, to interested Tribes.

3.10.4 Ethical Considerations

As part of the implementation process for the 2008 Northern Spotted Owl Recovery Plan (USFWS 2008, entire), the Service established the Barred Owl Stakeholder Group as a recovery implementation team under ESA Section 4(f)(2). The Service used this group, comprised of forty representatives from relevant government agencies, the forest product industry, Native American Tribes, environmental organizations, and animal welfare and protection groups, to help the agency identify and better respond to ethical issues involved with the proposed barred owl removal experiment. The Service acknowledges the value of this information in the implementation of the Barred Owl Removal Experiment (USFWS 2013, Section 3.6), and we considered and continue to rely on this as we progress from the experiment to management.

The primary perspectives from the ethical management of wildlife that were directly pertinent to the removal experiment were identified by Dr. William Lynn as follows:

- A crisis for northern spotted owls is at hand. Act accordingly.
- Use the most humane methods available and continue to develop nonlethal alternatives.

- Establish endpoints for the removal experiment and future management actions.

Based on the discussions of the Barred Owl Stakeholder Group, comments received during the scoping period for this EIS, and other public input, we note that each individual's reaction to lethal removal of barred owls for the survival of spotted owls is strongly affected by the individual's ethical values relative to wildlife and natural resources. For example, some people's values are centered on humans, with animals and nature valued to the extent they provide resources to people. Others values are centered on individual animals, animal populations, natural communities, or even the broader social community. Few personal value systems include only one of the categories. For the most part, people integrate some elements of all these views, simply placing more or less emphasis on each aspect. For example, a person may be very concerned about killing individual barred owls, but also concerned about saving the northern spotted owl from extinction. We do not consider any of these values right or wrong but acknowledge that they lead people to different judgments about management of barred owls and the methods employed.

We have been asked whether it is ethical to kill one species for the benefit of another. As noted above, individual values will lead to different responses to this question. While we understand the concerns, the Service has an obligation under the ESA to recover listed species by addressing the threats to that species. The Service has determined that in order to recover the northern spotted owl, the threat from the invasive barred owl must be addressed.

The Service takes these ethical concerns very seriously. The protocols for barred owl removal (Appendix 2) are specifically designed to be as humane as possible while addressing the need for managing the invasive barred owl to prevent the extirpation or extinction of native spotted owls.

As discussed in Chapter 2, all action alternatives involve the lethal removal of barred owls, and all alternatives that relied on non-lethal management were determined not to be feasible or meet the purpose and need of the action. As ethical considerations around lethal removal are the same across all action alternatives, the Service did not attempt any type of comparison or more detailed analysis of this topic.

3.10.5 Environmental Justice

Environmental justice is defined in Executive Order (E.O.) 14096 (88 FR 25251) as the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment so that people: (i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and (ii) have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices. An environmental justice impact occurs when an adverse impact disproportionately affects an already vulnerable population. This E.O. builds on previous guidance in E.O. 14008, E.O. 13985, E.O. 12898, and

other direction to carefully consider potential disproportionate impacts to vulnerable populations from any Federal action, and work to avoid, minimize, or mitigate those impacts.

None of the alternatives analyzed would result in the increase in any pollution risk or other hazards that could impact low income, minority, or other vulnerable populations. For example, the removal protocol specifically requires the use of non-lead shot to ensure no contamination of the environment from lead. Barred owl management is also not anticipated to significantly increase the vehicle use in management areas beyond the normal variation associated with forest management under any alternative, and thus any effects on local air pollution, regional greenhouse gas emissions or global climate change that could further impact low income or minority populations would be negligibly small (Section 3.9.2). In Section 3.8 we conclude that there are no reasonably foreseeable significant impacts on timber harvest or associated socioeconomic conditions under all alternatives, and therefore there would be no potential disproportionate economic effects on environmental justice populations or communities. Under all alternatives, there is also no effect on access to recreational opportunities or public land as a result of barred owl management that could affect vulnerable populations.

3.10.6 Geology, Soils, Water, Vegetation, and Air

All alternatives involve the use of existing roads or trails and require no ground disturbing activities. All removal under the action alternatives requires the use of non-lead shot, preventing contamination of land or water. Thus, there is no foreseeable effect of this action on geology, soil, water, vegetation, or air resources, and these resource areas were eliminated from further detailed analysis.

3.11 Irreversible and Irretrievable Commitment of Resources

The CEQ regulations at 40 CFR 1502.16 require Federal agencies to consider any irreversible or irretrievable commitment of resources in the evaluation of environmental consequences should a proposal be implemented. An irreversible or irretrievable commitment of resources would occur if there were impacts on, or losses to, resources that cannot be recovered or reversed, or that would require a very long period of time to recover.

Implementation of any of the alternatives, including the no action and selected alternatives, would not include any construction or ground disturbing activities. Barred owl removal would be conducted from existing roads and trails and lead shot is not allowed in any barred owl removal, removing the potential for contamination of soil or water. Therefore, none of the alternatives would involve irreversible or irretrievable commitment of geologic resources, soils, water, or vegetation. Because none of the alternatives involve any ground disturbing or other activities that might result in direct or indirect effects to known or potential cultural resources, there is no irreversible or irretrievable commitment of cultural or historic resources. The Service determined that effects on regional greenhouse gas emissions or global climate change resulting from implementation of the action alternative would be negligibly small. Individual barred owls will be lethally removed from areas under management. For these individuals, the action is irreversible. Barred owl populations, both within the ranges of the northern and California spotted owls and their global range in North America, will be affected

to varying degrees. Even under full implementation of the most extensive action alternative, removal of barred owls would leave 50 percent of the barred owl population unmanaged across the range of the northern spotted owl and some individuals would likely remain within the barred owl management areas. If barred owl removal is terminated in a management area, barred owl populations could recover within the removal areas in a relatively short period of time as they reestablish territories and reproduce. Thus, there is no irreversible or irretrievable commitments of resources relative to barred owls as a species.

The no action alternative, with the absence of barred owl management, would result in the extirpation of northern spotted owls from major portions of their historical range in the near future and the likely extinction of the northern spotted owl within the foreseeable future. Continued invasion of barred owls into the California spotted owl range under the no action alternative would displace California spotted owls and cause or exacerbate population declines. This expected large scale extirpation or extinction of spotted owls would be an irreversible and irretrievable consequence. In contrast, all action alternatives would maintain at least some northern and California spotted owls, allowing for continued or future recovery. Thus, there is no irreversible or irretrievable commitments of resources relative to spotted owls under the action alternatives.

The Service determined that the no action alternative and all action alternatives would have no significant direct or indirect effect on other species at the population or species level, including marbled murrelets. As noted elsewhere, there is the potential under the action alternatives for the incidental take of marbled murrelets relating to shotgun disturbance, and the unlikely (but not impossible) incidental take of a northern spotted owl through misidentification. The loss of these individual animals would be irreversible. However, we anticipate no irreversible or irretrievable commitments of resources relative to these or other species.

None of the alternatives in this FEIS require any entity to implement barred owl management or change any land management plan or agreements and can generally be applied in concert with existing land management. The sound of shotgun discharges during removal may briefly disturb recreationists in areas where shooting is not typically allowed, but this does not represent a long term or permanent change in recreation and visitor use. Therefore, no alternatives would involve irreversible or irretrievable commitment of resources related to recreation and visitor use.

The no action alternative would result in extirpation of native spotted owls from the wilderness forest lands, resulting in an irreversible and irretrievable loss of the natural quality of these wilderness lands. Since all action alternatives may include barred owl management within wilderness areas, implementation would not result in an irreversible and irretrievable loss of spotted owls in these areas. All alternatives would temporarily affect the untrammeled, undeveloped, solitude or primitive and unconfined recreation, and other qualities of wilderness, but would not include any long-term changes. None of these effects are irreversible and irretrievable.

The no action alternative would have no significant effect on socioeconomics, therefore no irreversible or irretrievable commitment of resources. Under all action alternatives, barred owl

management would result in an increase in occupied spotted owl sites, resulting in a potential for a small, indirect effect on timber harvest and associated revenues in Oregon, Washington, and northern California. Large landowners and land managers can often schedule around these issues to avoid take of an owl, and avoid reduced harvest but there is a potential for a small irretrievable loss of resource value for small landowners who may not have alternative areas to harvest to avoid taking an owl occupying their lands. Small landowners are not required to allow barred owl removal from their lands, and therefore have some control over the potential for irretrievable loss of resource value. However, in some cases, the effect of removal on neighboring lands may result in the presence of new or reoccupied spotted owl sites that effect small landowners.

In sum, there is potential irreversible or irretrievable commitment of resources related to the extirpation or extinction of spotted owls with the absence of barred owl management under the no action alternative. Under the action alternatives, there will be irreversible effects as individual barred owls removed, but even at maximum implementation, no irreversible or irretrievable loss of the barred owl as a species, even from the range of the spotted owl. There is some limited potential for incidental take (and therefore irreversible effects) to individual marbled murrelet or northern spotted owls, though these are considered unlikely and would not result in irreversible impacts at population or species levels. Under the action alternatives, as barred owl manage occurs on or near private lands, there is the potential for small landowners to be impacted by reoccupying spotted owls preventing harvest options (to avoid take).

Chapter 4: Cumulative Effects

This chapter presents the analysis of potential cumulative effects of the proposed action and action alternatives on the human environment. The CEQ NEPA Regulations provide the following definition: "the effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 Code of Federal Regulations [CFR] 1508.1(g)(3)).

4.0 Changes between Draft and Final EIS

- Updated information on State and private lands agreements.

4.1 Past, Present, and Reasonably Foreseeable Actions

For this FEIS, reasonably foreseeable future actions include the continuation of present management actions of Federal and non-federal landowners and managers across the range of the analysis area. As it would be speculative for the Service to anticipate site-specific actions that would occur in the future on lands managed by others over the time period analyzed in the FEIS, the Service based our assumptions about future management on other ownerships on existing and proposed or draft plans, current trends, and the potential effect of existing laws, regulations, and management plans. This analysis includes proposed planning efforts currently underway that the Service considers as reasonably foreseeable actions for analyzing cumulative effects, including HCPs, SHAs, or CBAs, and other management plans that have been released for public review. These assumptions provide context for evaluating the incremental effect of the alternatives when added to the effects of other past, present, and reasonably foreseeable actions.

The analysis area includes the ranges of the northern and California spotted owl, forest areas within 15 miles of these ranges, the Central Valley of California, areas between the range of the northern spotted owl and California spotted owl range, and forest areas between the Sierra Nevada and Coastal-Southern California portions of the California spotted owl range.

4.1.1 Forest and Forest Management

The action alternatives evaluated in this FEIS occur on forest lands, where barred owls reside and could be managed for the conservation of spotted owls as described in the purpose and need. The action alternatives generally occur within forested landscapes across western Washington, western Oregon, and California. These forest lands have a variety of uses, including but not limited to timber production, wildlife habitat, recreation, conservation, fire management, water supply, grazing, wilderness, and rural housing. The proposed action and associated action alternatives do not require or anticipate any changes in land management. Therefore, these types of forest use and management activities have occurred in the past, are currently occurring, and are expected to continue throughout the analysis period of 30 years.

4.1.2 Federal Lands

National Forest lands within the northern spotted owl range are managed under Land and Resource Management Plans as amended by the Northwest Forest Plan (USDA and USDI 1994a, entire; USDA and USDI 1994b, entire). Bureau of Land Management lands are managed under Southwestern Oregon, and Northwestern and Coastal Oregon RMPs, which have similar land allocations as the Northwest Forest Plan (BLM 2016a and b). These plans include a combination of various land allocations and associated standards and guidelines for management leading to current levels of timber harvest, recreation, and wildlife management on these lands. These plans were developed, in part, to provide contributions to the conservation of northern spotted owls. On National Forest lands, additional large-scale forest management actions are being planned and undertaken as part of the Wildfire Crisis Strategy (USDA Forest Service 2022, entire), but these actions must still be consistent with the Northwest Forest Plan. National Parks and National Recreation Areas are managed under General Management Plans specific to each area. All include conservation measures for native wildlife, including spotted owls.

California BLM-administered lands within the range of the northern spotted owl are managed under the Arcata and Redding RMPs, as amended by the Northwest Forest Plan. The BLM in California is preparing a Resource Management Plan known as the Northwest California Integrated Resource Management Plan with an associated EIS that will replace these. The BLM initiated public scoping for the Northwest California Integrated Resource Management Plan and EIS in April 2022. A public review Draft EIS is expected in late 2023. When completed, this will replace the existing Arcata and Redding RMPs, which currently follow the Northwest Forest Plan provisions.

In California, the U.S. Forest Service has been a part of ongoing conservation efforts for California spotted owls, including the 2004 Sierra Nevada Forest Plan Amendment and the 2005 Southern California National Forest Land and Resource Management Plans. In 2019, the Inyo National Forest completed its own land management plan. Implementation of these plans results in the current levels of timber harvest, restoration, recreation, and wildlife management on these lands. Revised forest plans for the Sierra and Sequoia National Forests were completed in 2023 (88 FR 34126). Additional large-scale forest management actions are being planned and undertaken as part of the Wildfire Crisis Strategy (USDA Forest Service 2022, entire), which have the potential to significantly impact barred and spotted owl habitat. Conservation measures associated with these planning efforts emphasize the protection and management of California spotted owl activity centers, territories, and home range core areas, increasing the frequency of large trees on the landscape, and increasing structural habitat diversity.

California BLM-administered lands within the range of the California spotted owl are managed under a variety of RMPs completed at different times. The Redding RMP (BLM 1993, entire) and South Coast RMP (BLM 1994, entire) do not mention California spotted owls specifically, but California spotted owls are a BLM sensitive species, and these RMPs include general provisions to minimize the decline of Special Status Species through the mitigation of resource management impacts and promote the enhancement of Special Status Species through positive management of their populations and habitats. The Eagle Lake and Sierra RMPs were completed in 2008. Both contain direction to manage suitable habitat to maintain or increase forest

characteristics for California spotted owls, as does the Bakersfield RMP for the Kaweah Area of Critical Environmental Concern.

4.1.3 State and Private Lands

Washington

In Washington, the WDNR completed the State Trust Lands HCP in 1997, which was amended in 2019 (WDNR 1997, entire; WDNR 2019, entire). This ecosystem-based forest management plan addresses forest management and other activities on the State trust lands it manages for revenue for the respective Trusts while developing and protecting habitat for spotted owls. State Parks and State Department of Fish and Wildlife lands are managed with an emphasis on recreation and wildlife, though small areas of forest may be affected by other management decisions. The WDNR is currently preparing a draft programmatic agreement for all non-federal lands within the State of Washington subject to State Forest Practices regulations and within the range of the Northern spotted owl. The agreement and associated take authorization is proposed to cover various timber management activities and Northern spotted owl conservation strategies including stand retention, extended rotation and thinning. The mechanism for take authorization may be either an Incidental Take Permit or Enhancement of Survival Permit.

There are two local government HCPs and one SHA that cover spotted owls in Washington. The Green River Water Supply Operations and Watershed Protection HCP includes committing a portion of the lands to no or limited harvest and protection of spotted owl sites with seasonal restrictions and year-round protection in some portions of the area. Seattle's Cedar River Watershed HCP contains substantial forest reserves, forest management to enhance old forest structure and increase resilience in some areas, and protection of active spotted owl sites. The City of Everett SHA includes set-asides and deferrals, extended rotation, and tree retention, as well as protection of active spotted owl sites.

Private forest timber lands in Washington are managed under the Washington Forest Practices Act. Management levels are tied to the Washington State designated Spotted Owl Special Emphasis Areas (SOSEAs). Spotted owl sites outside of SOSEAs receive limited protection only during the nesting season (WAC 222-10-041(5)). Within SOSEAs, spotted owl sites known as of July 1, 1996, continue to be protected (WAC 222-10-041(4)).

Eight private landowners in Washington are implementing forest HCPs and SHAs, including Weyerhaeuser (I-90) and CCF subsidiary of The Nature Conservancy (I-90) which include management provisions for landscape levels of spotted owl habitat and buffers around sites; Port Blakely Robert B. Eddy Tree Farm, which includes landscape amounts of forest stages driven by harvesting schedule and active mid-rotation management as well as protection of spotted owl core areas and seasonal protection; and the Sierra Pacific Mineral Tree Farm focused on dispersal habitat and distance between patches to support connection between Federal lands.

The Tagshinny SHA established a designated baseline of forests over 40 years old, and protective provisions for occupied spotted owl nest sites. The Port Blakely Morton Block SHA maintains baseline and improves habitat conditions as well as protecting some owl sites. The

Broughton Lumber Co., Lupine Forest LLC, and Series One of Twin Creeks Timber were originally part of the single SDS Lumber SHA and retain the requirements of that SHA. This includes set-a-sides, thinning, established landscape amounts of habitat that vary by conservation role of the area.

In addition, there are two SHAs covering marbled murrelets, Rayonier Operating Company, LLC and Sierra Pacific Land & Timber Company, both of which protect all existing murrelet occupied sites on their forest lands. Weyerhaeuser Timber Holdings, Inc. has a draft SHA for murrelets, with the same conditions, that was released for public review and comment.

Oregon

ODF manages lands throughout the range of the northern spotted owl in Oregon, including the Tillamook, Clatsop, Santiam, and Sun Pass State Forests. The ODF manages these lands under the 2010 Northwest Oregon State Forests Management Plan (FMP) (ODF 2010a, entire), 2010 Southwest Oregon State FMP (ODF 2010b, entire), 1995 Eastern Region Long-Range FMP (ODF 1995, entire), and district-level implementation plans. The ODF is currently preparing the Western Oregon State Forests (WOSF) HCP (ODF 2022, entire) and a companion FMP is in development and will replace the 2010 Northwest and Southwest Oregon FMPs. The proposed WOSF HCP and EIS were issued for public comment on March 22, 2022 (87 FR 24191). Under the proposed HCP, conservation actions implemented in the habitat and riparian conservation areas are intended to conserve, protect, and enhance habitat for aquatic and terrestrial covered species. Areas outside these conservation areas would be managed for timber production, but would still contribute habitat for covered species at the landscape level.

The Oregon Department of State Lands is developing an HCP for the Elliott State Research Forest in Coos and Douglas Counties. The plan proposes to balance forest research and management activities with the conservation of rare species and their habitat on the forest. The proposed HCP and EIS were released to the public on November 18, 2022.

Oregon State Parks are managed with an emphasis on recreation, though small areas of forest may be affected by other management decisions.

Most private forest lands are maintained as commercial timberlands dominated by plantations composed of relatively young, uniform forest. Private and non-federal lands must be managed in accordance with the Oregon Forest Practices Act and associated Forest Practice Administrative Rules. As outlined in Oregon Administrative Rules Chapter 629, the Forest Practice Administrative Rules address requirements for some forest management activities and protection of a 70-acre core area for active spotted owl sites.

Weyerhaeuser's Millicoma Tree Farm HCP was completed in 1995, providing management specific to providing dispersal habitat for spotted owls between State and Federal lands in the area. Port Blakely HCP for the John Franklin Eddy Forestlands in Clackamas County, Oregon covers younger forest without known spotted owl sites on the company's lands. The HCP provides for maintenance of specific foraging habitat using deferred timber harvest and protection of core areas if spotted owls do establish territories. SHAs were signed with Roseburg

Resources Company, Weyerhaeuser Company, and Oregon Department of Forestry to assist in implementation of the barred owl removal experiment. These SHAs and the associated permits allow for the take of spotted owls that return to previously unoccupied sites as a result of barred owl removal during the experiment and for 5 to 8 years following the termination of barred owl removal. These SHAs and permits end in 2026 for Roseburg Resources Company and Weyerhaeuser Company, and 2028 for the Oregon Department of Forestry.

California

In California, the primary State lands subject to conduct timber harvest in the northern spotted owl range are in the Jackson State Demonstration Forest, managed by the California Department of Forestry and Fire Protection (Cal FIRE). All potential habitat on State and private timberlands is surveyed for at least two years prior to timber harvest and any spotted owl sites are protected according to the California Forest Practices Rules (California Code of Regulations Title 14). Once sites are established, site-specific management continues, even if the site becomes unoccupied.

California regulations require a timber management plan for harvesting on private timberlands. This includes surveys over all habitat and for spotted owl sites, and consideration of all spotted owl sites already entered in the State's database. Take avoidance is required for all spotted owl sites, whether currently occupied or not.

There are three forest HCPs covering northern spotted owls in California, with incidental take permits held by Green Diamond Resources Company, Sierra Pacific Industries, and Humboldt Redwood Company.

Under the Green Diamond HCP, the company creates and maintains a mosaic of high-quality habitat for northern spotted owls. The primary conservation strategy for spotted owls is the designation and management of dynamic conservation areas, the minimization of harm to the species, and long term barred owl removal research commitments. The plan includes the avoidance of marbled murrelets.

The fundamental approach of Sierra Pacific Industries' HCP is the implementation of conservation measures to maintain landscape-scale habitat conditions equivalent to habitat currently used by spotted owls, increase opportunities for spotted owl occupancy, accelerate the recovery of lands degraded by catastrophic events to provide future spotted owl habitat, and minimize and mitigate impacts to spotted owls The HCP also includes a commitment to addressing barred owls as a stressor on both northern and California spotted owls through the implementation of several barred owl studies that include removal of barred owls.

The Humboldt Redwood Company HCP includes reserve areas and a habitat-based approach, including harvest, retention, and recruitment of potential northern spotted owl foraging, roosting, and nesting habitat in watersheds across the ownership and through the HCP. The HCP also includes protection of Marbled Murrelet Conservation Areas.
In addition, there are one small HCP (Terra Springs LLC) and two small SHAs (Forster-Gill, Inc, and Van Eck) that include coverage for spotted owls in California. The larger PG&E Multiple

Region Operations and Maintenance HCP includes coverage for northern spotted owls and marbled murrelets.

4.2 Cumulative Effects

The cumulative effects analysis applies a qualitative approach because effects from the alternatives, added to the effects of past, present, and reasonably foreseeable actions, could occur in different timeframes or locations within the analysis area, making quantification of impacts infeasible. We address the cumulative effects for each resource evaluated in Chapter 3, Affected Environment and Environmental Consequences.

4.2.1 Barred Owls

Barred owls are a generalist predator and eastern forest species that invaded the western U.S. in the 1960s. They have continued to invade southward and build large populations in the forests of the Pacific Northwest, overlapping with the native northern spotted owls. Barred owls are now found within the range of the California spotted owl. Competition from barred owls is one of the primary causes of the precipitous decline in northern spotted owl populations, and a primary threat to both subspecies. While barred owls prefer older forest characteristics, they are found in high density in younger forests. Barred owls, being a generalist in both prey and habitat, have thrived in the forest conditions resulting from past and present actions described above and this trend is anticipated to continue into the foreseeable future in the absence of specific barred owl management actions.

As discussed in Chapter 3.3, implementation of barred owl management associated with any of the action alternatives would adversely affect barred owl populations in specified management areas. The potential for negative effects to the larger global barred owl population varies by alternative, though is less than one percent of the global population annually. Where barred owls are not removed they will continue to reproduce over the 30 years of the analysis, providing for continuing strong global populations.

Because barred owls can utilize a wider variety of forest conditions, the effect of climate change on barred owls is not expected to change the impact of the action alternatives on barred owl populations. For similar reasons, continued forest management described above (Section 4.1.1 through 4.1.3) is not expected to have a significant effect on barred owl at a population scale. Thus, there would be no further cumulative impacts from the actions discussed above combined with impacts occurring under the action alternatives. There would also be no cumulative effects under the no action alternative, which would allow the continued expansion of the range and population of barred owls.

4.2.2. Spotted Owls

Habitat loss and competition from barred owls are the primary past and present factors in the continuing decline of northern spotted owls. The northern spotted owl was listed as threatened throughout its range “due to loss and adverse modification of spotted owl habitat as a result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and

windstorms" (55 FR 26114). Our 2019 status review noted trends toward increasing loss of habitat to wildfire, and continued loss of habitat to timber harvest on non-federal lands, though the Northwest Forest Plan, and BLM RMPs slowed habitat loss and allowed for habitat growth on Federal lands (USFWS 2020, p. 10). These trends continue under the actions described above.

California spotted owls are currently found throughout their known historical range, although there is evidence of a decrease in abundance in parts of the range including both the Sierra Nevada and Coastal-Southern California. Threats currently impacting the Sierra Nevada population include large-scale, high-severity fire; tree mortality; drought; climate change; various impacts from fuels reductions and forest management; competition from barred owls; and rodenticides. Threats currently impacting the Coastal-Southern California population include largescale, high-severity fire; tree mortality; drought; climate change; various impacts from fuels reductions and forest management; and rodenticides. Depending on the method used and how it is implemented, fuels reductions and forest management practices can have both positive and negative influences on the species. The existing regulatory mechanisms and conservation measures do not completely ameliorate the negative impacts of fuels reductions and forest management practices to California spotted owls; however, land management direction, including the Sierra Nevada Forest Plan Amendment, includes protective standards and guidelines that must be adhered to while conducting management activities in California spotted owl habitat (88 FR 11600). The 2019 Conservation Strategy for the California Spotted Owl in the Sierra Nevada (USDA Forest Service 2019, entire) outlines numerous conservation measures that are being incorporated into ongoing planning efforts, and we anticipate that these measures will continue to guide the current and reasonably foreseeable actions described above.

The cumulative effects on spotted owls from the actions discussed above, including forest management resulting in habitat loss (e.g., timber harvest) and management supporting reductions in habitat loss to wildfire (e.g., fuels reduction), combined with the beneficial effect of the removal of barred owls under the action alternatives could be both positive and negative. Removal of barred owls via any of the action alternatives would likely reduce the overall negative effects. The cumulative effect of the above actions and the no action alternative, with its increasing invasion of barred owls, would be negative.

4.2.3. Other Wildlife

Barred owls are generalist predators that prey on a very wide variety of species including, but not limited to, mammals, birds, amphibians, reptiles, mollusks, crustaceans, and insects. Because barred owls are not native to the ecosystems within the analysis area, these potential prey species are not adapted to this additional and novel source of predation. Barred owls have developed dense populations in some areas and are likely to do so in other areas as they expand, further impacting potential prey, and competing with native predators.

The cumulative impacts on potential prey or competitors (see chapter 3.5) from the forest management actions listed above, combined with the incremental effects of the no action and action alternatives, would vary by location, habitat needs, and the potential for these species to be affected by the ongoing forest management. Removal of this new predator/competitor would reduce the cumulative negative effects for species negatively affected by forest management. For

species that benefit or experience neutral effects from forest management, barred owl removal would result in increased beneficial effects wherever barred owl management overlaps with the species' range. The no action alternative would have an adverse effect on potential prey and competitor species by allowing the continuing increase in barred owl populations and invasion of the California spotted owl range, exacerbating any negative effects from past and ongoing forest management.

4.2.4. Marbled murrelet

Marbled murrelets are threatened by loss of forest nesting habitat (including fragmentation) via harvest and disturbance events (e.g., wildfire and insect and forest disease outbreaks), and climate change, including offshore climate change effects that could result in diminished prey availability. Marbled murrelet can be disturbed by loud noise close to forest nest sites, which can lead to flushing adults or juveniles or preclude adults from feeding young. Given the overlap of barred owl and marbled murrelet nesting habitats, barred owls are likely to prey on murrelet chicks or adults.

The adoption of the Northwest Forest Plan, as described above, greatly reduced, but did not entirely stop, the loss of marbled murrelet habitat on Federal land after 1994. Recent losses are attributed to timber harvest and wildfire (Lorenz et al. 2021, p. 33). The BLM's updated management plans included an additional 31,991 acres of marbled murrelet nesting habitat in Late Successional Reserves/Riparian Reserves beyond what had been included when those BLM units were managed under the Northwest Forest Plan. The marbled murrelet continues to receive some protection under State laws in Washington, Oregon, and California, though at varying levels. Several HCPs and SHAs, described above, include marbled murrelets as a covered species and conservation measures for marbled murrelets.

The cumulative impacts on marbled murrelets from the actions discussed above, combined with to those impacts occurring under the no action and action alternatives, are both positive and negative. Under the action alternatives, where barred owl management actions overlap marbled murrelet habitat during the marbled murrelet nesting season and the removal site is close to a marbled murrelet nest, the resulting disturbance of the shotgun discharge could lead to flushing of the adult or disruption of a feeding effort. Given that that removal at a particular location is dispersed over time, the potential impact at any given nest would be unlikely, but possible, and could have negative effects on the individual marbled murrelets. The removal of barred owls would have a positive effect in reducing the potential for predation of marbled murrelets on their nests. The no action alternative would not result in disturbance but would not reduce the potential for barred owl predation of marbled murrelets.

The potential for both positive and negative effects to marbled murrelets would vary by alternative. This potential for effects would be greatest in Alternative 3, with the largest area of potential barred owl management overlapping with marbled murrelet habitat. The least potential impact would be under Alternative 6, with the smallest amount of marbled murrelet habitat overlapping potential barred owl management areas. The incremental effects of the action alternatives, added to the effects of current and reasonably foreseeable forest management, could result in both positive and negative cumulative effects on marbled murrelets.

4.2.5 Recreation and Visitor Use

In National Parks, National Recreation Areas, wilderness areas, and other areas with limited forest management, recreation and visitor use is a primary focus of the land management and anticipated to continue under the current plans. On National Forest and BLM-administered lands, recreation and forest management are one component of management planning. Recreational visitors to these lands expect to encounter forest management activities and their effects. Therefore, we do not anticipate changes in recreation from the actions listed above.

The cumulative impacts on recreation and visitor use from these actions, combined with the incremental impacts occurring under the action alternatives, could affect the recreational experience for some visitors. All action alternatives could result in adverse effects to the soundscapes of forest environments, particularly in areas closed to hunting or target shooting where such noise is unexpected, such as National Parks. Increased sounds of shotgun discharge, particularly outside of the hunting season, could temporarily affect visitor experience on any landscape. The no action alternative would not affect current recreation or visitor use.

The potential for impact to recreation and visitor use would be greatest under Alternative 3 due to the larger area available for barred owl management actions. The potential for impact would be least under Alternative 6, with the smallest area of barred owl management, or Alternative 5, with the smallest acreage of National Park and National Recreation Areas units. The incremental effects of the action alternatives, added to the effects described above, would result in an adverse cumulative effect on recreation, depending on the location and timing of the removal activity.

4.2.6 Wilderness

Human activities in wilderness areas include hiking, camping, fishing and hunting. Hunting and fishing are regulated by the States. The land management plans described above provide some direction on management of specific wilderness areas, as do the Wilderness Act and associated regulations. We anticipate management of wilderness will continue as described in these plans.

The cumulative impacts from the actions discussed above, combined with those impacts occurring under the no action and action alternatives, may have both positive and negative effects on wilderness areas. While wilderness areas are ideally managed to leave ecosystems unaffected by human manipulation, Federal agencies also have a responsibility to aid in the recovery of Federally listed species and address the impacts of invasive species.

Under all action alternatives, barred owl removal could occur within wilderness areas. Most removal activity would occur along trails and would be less frequent and cover smaller areas than that occurring in well-roaded areas outside of wilderness. The primary, though minor, adverse effect would be from the occasional and dispersed use of shotguns, and the noise they create, on the soundscape. Most removal would occur in the spring through fall. In the fall, this activity would coincide with hunting season and may not be discernable in wilderness areas open to hunting. The primary beneficial effects would be from the reduction in the presence and population of a non-native generalist predator, releasing this additional pressure from native

species, including the spotted owl. The incremental effects of the action alternatives, added to the effects described above, could result in both positive and negative cumulative effects on wilderness.

4.2.7 Climate change

The potential effect of the alternatives is presented in Chapter 3.9 Climate Change. Forest management may have both positive and negative effects on climate change. Growth of trees and forests provide for carbon sequestration, while timber harvest leads to emissions and carbon release.

The cumulative impacts from the actions discussed above, combined with the negligibly small impacts to climate change occurring under the action alternatives, have a negligibly small effect on regional greenhouse gas emissions or global climate change. The no action alternative has no effect on climate change.

Chapter 5: Summary of Submitted Alternatives, Information, and Analyses

This chapter summarizes the alternatives, information, and analyses submitted by State, Tribal, and local governments and other public commenters during the scoping and DEIS comment period for consideration by the lead and cooperating agencies in developing the FEIS (40 CFR 1502.17).

As described in Section 1.4, the Service published a notice of intent to prepare an EIS opening a 30-day public scoping period on July 22, 2022, through August 22, 2022 (87 FR 43886). All comments received during scoping are summarized in additional detail in Appendix 5. The full contents of all scoping comments are available on Regulations.gov under the docket FWS-R1-ES-2022-0074-0001.

The Service published the notice of availability for the DEIS evaluating the impacts on the human environment related to the proposed Strategy in the Federal Register on November 17, 2023 (88 FR 80329), opening a 60-day comment period. Responses to public comments are provided in additional detail in Appendix 6. The full contents of all DEIS comments are available on Regulations.gov under the docket FWS-R1-ES-2022-0074-0048.

5.0 Changes between Draft and Final EIS

- Added information on DEIS public comments.

5.1 Alternatives

Comments received during scoping included the following suggestions for inclusion into alternatives in the EIS:

- A no action alternative that includes allowing barred owl to spread and outcompete the northern spotted owl.
- Do not kill either species and protect both species.
- Maintain the California spotted owl's role in ecosystems without managing barred owls.
- Only humane (non-lethal) management.
- Maintain habitat rather than barred owl management.
- Focus on lethal removal to effectively address the threat of barred owl competition.
- Use both lethal and non-lethal approaches, especially in more populated areas.
- Promote research into non-lethal strategies such as birth control that could be integrated into barred owl control efforts over time.
- Ensure quick and aggressive implementation to prevent northern spotted owl extirpation.
- A more gradual approach for barred owl management to slow down and prolong the rate of introgression to avoid genetic swamping for a limited term.
- Use shooting for lethal removal instead of poison to avoid impacts to non-target species.

- Act immediately with lethal removal across all land ownerships, across the range of northern spotted owl.
- Include long term, sustained removal actions required for barred owls to be prevented from expanding their range or kept at such low numbers that they are not a significant threat to the spotted owl.
- Utilize private individuals with extensive training and incentive programs to remove barred owls on multiple land ownership types including private and county lands.
- Describe how non-target impacts will be avoided.
- Conduct further study, including gathering additional genetic/genomic data through full-genome sequencing prior to managing barred owl, as well as if forest management has contributed to barred owl invasion and how forest type affects both species.

We considered these comments during development of the five action alternatives analyzed in detail in this EIS. Many of the above elements and concepts were included in the proposed action or additional action alternatives. Others were considered but eliminated from detailed analysis, as discussed in Section 2.10.

Comments received during the comment period on the DEIS included a number of clarification questions about components of the various alternatives, and recommended revisions and additions to alternatives including:

- Expanding the range of alternatives to include other management strategies for providing and protecting suitable habitat such as halting the logging of ancient forests, restoring, or creating habitat, or other management practices to reduce habitat loss.
- Further emphasizing the use of non-lethal methods of control, including translocation, hazing, and reproductive interference.
- Revising specific alternatives by modifying where to prioritize or limit barred owl removal across the landscape.
- Consideration of outcomes of each alternative under various levels of implementation.

Comments on suggested alternatives are summarized and addressed in Appendix 6, along with the Service's response.

5.2 Information and Analyses

A wide variety of supplemental information and analyses (i.e., supplemental materials or references) from diverse sources including books, technical reports, management plans, scientific papers, academic theses, legal opinions, video files, web-based tools, survey data, and references to Federal and State legislation and regulations were submitted during both the scoping and public comment periods for consideration by the lead and cooperating agencies or public commenters. Information varied considerably in scope and scale. We considered all information and analyses submitted during development of the DEIS and FEIS.

A detailed list of all information and analyses received during scoping is provided in Appendix 5. Information and analysis submitted during the public comment period is summarized and addressed in Appendix 6.

Glossary

Many of these terms have a long history and various meanings in regard to spotted owl and barred owl biology and management. In this glossary, we define these terms in the context in which they are used in this FEIS.

Action Area: All areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

Activity Center: Spotted owls have been characterized as central-place foragers, where individuals forage over a wide area and subsequently return to a nest or roost location that is often centrally located within the home range (Rosenberg and McKelvey 1999). An activity center is a location or point within a given core area that represents this central location. Nest sites are typically used to identify activity centers, or in cases where nests have not been identified, breeding season roost sites or areas of concentrated nighttime detections may be used to identify activity centers. *See also* **Core Area**.

Adaptive Management: A systematic approach for improving resource management by learning from the results of explicit management policies and practices and applying that learning to future management decisions.

Affected Environment: A portion of the NEPA document that succinctly describes the environment of the area(s) to be affected or created by the alternatives under consideration. It includes the environmental and regulatory setting of the proposed action. The environmental setting includes the physical environmental conditions in the vicinity of proposed action, including all natural resources (wetlands, wildlife, etc.), and the built environment (cultural resources, socioeconomics, etc.). Within the regulatory setting, the affected environment would include all applicable laws, regulations, permits, and policies associated with the effects of the proposed action. (40 CFR 1502.15)

Call-playback Survey Methods: Also "call-broadcast survey methods." Survey methods in which recorded calls are broadcast in order to elicit responses from the target species, allowing surveyors to document the presence and location of responsive individuals. These methods have been commonly used to detect spotted owls and barred owls. Barred owl removal protocols embedded in the proposed action include call-playback methods to locate individuals to be removed (see Appendix 2).

Candidate Species: Plant and animal taxa considered for possible addition to the Federal List of Endangered and Threatened Species. These are taxa for which the Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions (61 FR 7596-7613).

Capture-Mark-Resight: Experimental or monitoring method in which animals are captured, marked, released, and resighted many times by repeated sampling. The result is a set of capture and resight histories, one per observed animal, informative on survival, recruitment, and the size of the population (Pradel 1996, entire).

Carrying Capacity: The average population density or population size of a species below which its numbers tend to increase and above which its numbers tend to decrease because of shortages of resources. The carrying capacity is different for each species in a habitat because of that species' particular food, shelter, and social requirements [Encyclopedia Britannica Online].

Checkerboard Ownership: A interspersed pattern of land ownership whereby staggered sections of land are controlled by separate (usually two, one being an agency of the Federal government) landowners, usually on a section (square mile) by section basis, as a result of public land dispersal by the Federal government during the 19th century, such as for BLM-administered lands in western Oregon.

Coefficient of Variation: A measure of variation in a set of measurements, defined by the ratio of the standard deviation in the set of measurements to the mean (average) measurement. Coefficients of variation are usually represented as percentages, with larger values indicating wider variation.

Congressionally Reserved Lands: Lands under the jurisdiction of the Federal governmental that have been reserved by Congress for their unique natural or historical characteristics, including wild and scenic rivers, national parks and monuments, national recreation areas, designated wilderness, and similar lands.

Conservation: The terms "conserve," "conserving" and "conservation" mean to use 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 the 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, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking (ESA Section 3(3)).

Conservation Benefit Agreement (CBA): A voluntary agreement involving private or other non-federal property owners whose actions contribute to a net conservation benefit for covered (both ESA-listed and non-listed) species. Participating permittees receive an enhancement of survival permit authorizing take of covered species under Section 10(a)1A of the ESA including formal assurances from the Service that if they fulfill the conditions of the CBA, the Service will not require any additional or different management activities by the participants without their consent, and they may return the enrolled property to the baseline conditions that existed at the beginning of the SHA. The Service finalized regulations defining CBAs in April of 2024, replacing agreements previously known as Safe Harbor Agreements going forward.

Control (Experimental Control): In an experimental design, a study area or sample not subject to an experimental treatment, against which treatments may be compared. Under experimental conditions, the control is assumed to remain unchanged, since it is not subject to any treatment. For this proposed action, a control would be an area within which no barred owls would be removed, although barred owls within control areas may be monitored for occupancy or other biological parameters. *See also* **Treatment**.

Core Area: May refer to: 1) an area of concentrated use within a home range that receives disproportionally high use (Bingham and Noon 1997, pp. 128-129), and commonly includes nest sites, roost sites, and foraging areas close to the activity center. In this sense, core areas vary in size geographically, and in relation to habitat conditions, or 2) a 70-acre area including known northern spotted owl nest sites or the estimated area where nest sites may occur, as defined by the Oregon Forest Practices Act.

Covariate: In statistics, a variable that is possibly predictive of the outcome under study. Statistical models used in analyses of spotted owl demography data commonly include variables (i.e., covariates) for data describing habitat and weather conditions to determine the effects those conditions may have on spotted owls survival, fecundity, etc. More recent models have included a covariate to assess the presence of barred owls on spotted owl vital rates.

Critical Habitat: For Federal-listed species, this consists of: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the ESA, on which are found those physical or biological features (constituent elements) (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species. (ESA Section 3 (5)(A)) Designated critical habitats are described in 50 CFR Part 17 (Subpart I (FWS Species) and Part 266 (NMFS Species).

Cumulative Effects: Under NEPA, the effects of an action that are added to or interact with other effects in a particular place and within a particular time. Cumulative effects include the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity (Federal, non-federal, or private) is taking the actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative Impacts: *See* **Cumulative Effects**

Demographic Study: A field study that is designed to estimate vital rates (e.g., annual survival or reproductive rates). For spotted owls, such studies have historically involved tracking individually marked owls over time.

Demographic Study Area: ***See Spotted Owl Demographic Study Area***.

Demography: The study of characteristics of populations including population size, growth rates, density, distribution, and vital statistics.

Direct Effects: In a NEPA analysis, direct effects are caused by the action, and occur at the same time and place (40 CFR 1508.8). *See also* **Indirect Effects**.

Dispersal Habitat: Juvenile spotted owls often must disperse through a range of forest types prior to finding habitat on which to establish a territory. These forest types include nesting, roosting, and foraging habitat in addition to forest that meets the definition of dispersal habitat. For the northern spotted owl, the Interagency Scientific Committee (ISC) defined dispersal

habitat as forest stands with average tree diameters greater than 11 inches and conifer overstory trees with closed canopies (greater than 40 percent canopy closure in moist forests and greater than 30 percent in dry forests) and with open space beneath the canopy to allow spotted owls to fly can provide the minimum conditions needed for successful dispersal (Thomas *et al*. 1990, p. 310). We acknowledge that this definition primarily applies to moist forests in Oregon and Washington and may not capture the full range of dispersal habitat conditions in Northern California or drier forests across the range of the northern spotted owl.

Distinct Population Segment: A listable entity under the Endangered Species Act that encompasses that portion of a vertebrate species population that is discrete from the rest of the population and significant to the species (61 FR 4722).

Endangered Species: Any species which is in danger of extinction throughout all or a significant portion of its range, as defined in section 3(6) of the ESA.

Endangered Species Act: The Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). Also referred to within this document as ESA.

Enhancement of Survival Permit: Section 10(a)(1)(A) of the Endangered Species Act provides for the issuance of enhancement of survival permits associated with conservation actions that are beneficial to the species included on the permit. Enhancement of survival permits authorize take of ESA-listed (and non-listed) species above the baseline condition when the primary purpose of the associated conservation agreement is to implement beneficial actions that benefit the covered species. On April 12, 2024, the Service finalized revisions to the regulations for ESA section 10(a)(1)(A) and (B) that simplify the requirements for enhancement of survival permits by combining Safe Harbor Agreements and Candidate Conservation Agreements with Assurances into one agreement type, to be known as Conservation Benefit Agreements going forward (89 FR 26070).

Exotic Species: Exotic species are those species that occupy or could occupy park lands directly or indirectly as the result of deliberate or accidental human activities. Exotic species are also commonly referred to as nonnative, alien, or invasive species. Because an exotic species did not evolve in concert with the species native to the place, the exotic species is not a natural component of the natural ecosystem at that place. Genetically modified organisms exist solely due to human activities and therefore are managed as exotic species in parks (NPS 2006, pp. 43-48).

Extirpate: To cause the extinction of a species on a landscape of interest.

Foraging Habitat: Lands that provide foraging opportunities for spotted owls, but without the structure to support nesting and roosting (USFWS 1992, pp. 22-26). Spotted owls often forage in forest conditions that meet the definition of nesting/roosting habitat, but also use a broader range of forest types for foraging. This definition identifies habitat that functions as foraging habitat, but does not meet requirements for nesting or roosting.

Forest Lands: In the context of this document, any lands with the capability to grow forests or which were historically forested, including recently harvested or burned landscapes, and all ages

of forest. We use forest lands to provide reasonable representation of potential barred owl habitat.

Generalist Species: A species whose ecological strategy relies on adaptation to a relatively wide range of ecological conditions. The barred owl is considered to be a generalist species (especially as compared to the spotted owl), since it is adapted to a wide range of forest habitats. The barred owl utilizes a wide range of mammal, bird, mollusk, crustacean, and other animal species as its primary prey. *See also* **Specialist Species**.

Habitat Conservation Plan (HCP): A voluntary agreement involving private or other non-federal property owners whose actions are likely to incidentally take species listed as threatened or endangered under the ESA. If the Service finds an HCP meets the specified list of criteria, it issues an incidental take permit under section 10(a)1(B) of the ESA authorizing take of covered species. The HCP describes the anticipated effects of the proposed taking, how those impacts will be minimized and mitigated, and how the conservation measures included in the plan will be funded.

High-Quality Habitat: In reference to spotted owls, this is older, multi-layered structurally complex forests that are characterized by large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees. This is a subset of spotted owl habitat and specific characteristics may vary due to climatic gradients and abiotic factors across the range.

Historical Site: Sites that contained spotted owls in the past. These may be currently unoccupied or sites where spotted owls were detected in the past, but not surveyed more recently. Also called historical territories or historical activity centers.

Home Range: The area in which a spotted owl conducts its activities during a defined period of time (USFWS 1992, p. 479) that provides important habitat elements for nesting, roosting, and foraging. Home range sizes generally increase from south to north and vary in relation to habitat conditions and prey availability and composition.

Incidental Take Permit: Section 10(a)(1)(B) of the ESA allows for the issuance of incidental take permits to authorize take of ESA-listed species that is incidental to, but not the purpose of, carrying out otherwise lawful activities. Applications are supported by a conservation plan, also known as a habitat conservation plan, that must meet statutory issuance criteria including minimizing and mitigating the impacts of the authorized take.

Indirect Effects: In an NEPA analysis of effects, indirect effects "… are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" and may include "… effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on … ecosystems" (40 CFR 1508.8).

Invasion Pathways: Areas through which barred owl populations may move in the invasion of the California spotted owl range. This may include areas outside the range of the California spotted owl. If barred owl populations are established in these areas adjacent to the California spotted owl range, we expect that individuals from these populations will colonize the California spotted owl range.

Invasive Species: Under Executive Order 13751, 'Invasive species' means, with regard to a particular ecosystem, a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health. See Appendix 1 for more details.

Jeopardy (or Jeopardize the continued existence of): To engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02).

Known Spotted Owl Site: An occupied spotted owl site or a spotted owl site where spotted owls were documented to be present in the past.

Late-Successional Reserve: A land management allocation established under the Northwest Forest Plan to protect and enhance conditions of late-successional and old-growth forest ecosystems, and serve as habitat for late-successional and old-growth related species including the spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem.

Local Colonization Rate: The probability that an owl territory that is not occupied in a given year will become occupied in the following year (MacKenzie *et al*. 2006, pp. 40-41).

Local Extinction Rate: The probability that an owl territory that is occupied in a given year will become unoccupied in the following year (MacKenzie *et al*. 2006, pp. 40-41).

Matrix: Under the Northwest Forest Plan, those lands under the jurisdiction of the Forest Service or BLM within the range of the northern spotted owl not otherwise allocated within a Late Successional Reserve or Adaptive Management Area land status, or otherwise Congressionally or Administratively Withdrawn. Matrix land may, however, include Riparian Reserves. On some BLM-managed lands, these are referred to as Harvest Land Base allocations.

Meta-analysis: A statistical technique in which the results of two or more studies are mathematically combined in order to improve the reliability of the results. Studies chosen for inclusion in a meta-analysis must be sufficiently similar in a number of characteristics in order to accurately combine their results. Northern spotted owl researchers have completed several meta-analyses of demography and occupancy data on a minimum of eight demography study areas, with results reported in major research publications in 1996, 2000, 2006, 2011, 2016, and 2021.

Native Species: Under Executive Order 13751, 'native species' means, with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem. *See also* **Exotic Species**.

Non-native Species: Under Executive Order 13751, 'non-native species' or 'alien species' means, with respect to a particular ecosystem, an organism, including its seeds, eggs, spores, or other biological material capable of propagating that species, that occurs outside of its natural range.

Nesting and Roosting Forest Cover: Forest lands that provide nesting and roosting opportunities for spotted owls. Important stand elements may include high canopy closure, a multi-layered, multi- species canopy with larger overstory trees and a presence of broken-topped trees or other nesting platforms (e.g., mistletoe clumps (USFWS 1992, p. 23). The appearance and structure of these forests will vary across the range of the spotted owl, particularly in the dry forest provinces. Also referred to as nesting and roosting habitat. *See also* **Suitable Habitat**.

Non-Federal Lands: Tribal, State, municipal, or private lands in the United States. This includes any lands not managed by the Federal government.

Northwest Forest Plan: In 1993, President Clinton directed the Forest Ecosystem Management Assessment Team to develop long-term management alternatives for maintaining and restoring habitat conditions to maintain well-distributed and viable populations of late-successional- and old-growth-related species. The analysis of the Forest Ecosystem Management Assessment Team alternatives in a final supplemental environmental impact statement (USDA and USDI 1994a, entire) led to adoption of the land- allocation strategy contained in the record of decision (USDA and USDI 1994b, entire), commonly known as the Northwest Forest Plan.

Northwest Forest Plan Effectiveness Monitoring Program: A program under the Northwest Forest Plan to monitor the Plan's effectiveness in meeting its objectives, including northern spotted owl conservation objectives. The northern spotted owl module includes monitoring of population and habitat status and trends to evaluate the success of the Plan in arresting downward population trends, and in maintaining and restoring the habitat conditions necessary to support viable owl populations on Federal lands. Recently, this program has also included monitoring of barred owl presence on Federal lands in the Northwest Forest Plan area.

Occupancy: The proportion of sites occupied by the species of interest within a study area. In this EIS, site occupancy may refer to 1) for spotted owls, the proportion of known sites (i.e., territories) that are occupied at a specific time or 2) for barred owls and spotted owls, the proportion of passive acoustic monitoring stations where presence is detected.

Occupancy Model: A statistical method used to improve estimates of occupancy by a species of interest, by accounting for imperfect detectability. Occupancy models use repeated sampling to estimate the probability that the areas surveyed are occupied by the species of interest (MacKenzie *et al*. 2006, entire).

Occupied Site: Any location where territorial spotted owls are known to be present.

Park Resources: Within the National Parks and Monuments, wildlife and the processes and conditions that sustain them (NPS 2006, Section 1.4.6, p. 11).

Passive Acoustic Monitoring: Monitoring methods using autonomous recording units to record wildlife sounds (in this case, spotted and barred owl calls) for the purpose of detecting presence or collecting other information that can be inferred from audio recordings. The Northwest Forest Plan Effectiveness Monitoring Program has recently adopted these methods for northern spotted owl monitoring, and they are also used systematically to monitor California spotted owls and barred owls.

Pathway: Under Executive Order 13751, 'pathway' means the mechanisms and processes by which non-native species are moved, intentionally or unintentionally, into a new ecosystem.

Physiographic Province: Geographic region with a characteristic geomorphology in which climate and geologic factors have given rise to a variety of landforms different from those of surrounding regions. We use the 12 physiographic provinces used in the Northwest Forest Plan.

Population Growth Rate: In wildlife demography studies, the annual rate of population change, sometimes indicated by the symbol λ. A population growth rate value of 1 indicates a stable population, a population growth rate greater than 1 indicates an increasing population, and a rate of population change less than 1 indicates a declining population, and may be referred to as a negative growth rate.

Provincial: Referring to physiographic province. This is a qualifying term used with home range and core use area to reflect the fact that both vary in size according to latitude, amount of available habitat, prey availability, and forest structure and composition. Typically, home range and core use area sizes increase from south to north, and decrease as amount of high-quality habitat available to northern spotted owls increases.

Recovery: Improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the ESA (50 CFR 402.02).

Recovery Action: Each recovery plan prepared for a Federally-listed species describes the recovery actions found to be necessary to achieve the plan's goal(s) and objectives and the monitoring actions necessary to track the effectiveness of these actions and the status of the species. Recovery actions, when implemented, alleviate known threats and restore the species to long term sustainability. These actions might include (but are not limited to) habitat protection, limitations on take, outreach, research, control of disease, control of invasive species, controlled (including captive) propagation, reintroduction or augmentation of populations, and monitoring actions.

Recovery Plan: Section 4(f) of the ESA directs the U.S. Fish and Wildlife Service to develop and implement recovery plans for threatened and endangered species, unless such a plan would not promote conservation of the species. According to the statute, these plans must incorporate, at a minimum, a description of site-specific management actions necessary to achieve recovery of the species; objective, measurable criteria which, when met, would result in a determination that the species be removed from the list; and estimates of the time and costs required to achieve the plan's goal. The Service completed a recovery plan for the northern spotted owl in 2008 (USFWS 2008, entire), and revised that plan in May, 2011 (USFWS 2011, entire). The Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-62 to III-68) identifies nine recovery actions specific to addressing the threat that barred owls represent to conservation and recovery of the northern spotted owl.

Recruitment: In spotted and barred owl biology, the addition of individuals into the territorial population at the start of each breeding season. An individual owl is considered recruited into the population if it is alive at the beginning of the first breeding season *after* its year of birth (i.e., it is nearly one year old).

Removal: In this proposed action, removal is the killing of territorial barred owls, via shooting or capture and euthanasia, for the purpose of reducing barred owl populations or preventing their establishment.

Safe Harbor Agreement: A voluntary agreement involving private or other non-federal property owners whose actions contribute to a net conservation benefit for listed species on non-Federal lands. Participating property owners receive an enhancement of survival permit authorizing take of listed species under Section 10(a)1A of the ESA, including formal assurances from the Service that if they fulfill the conditions of the SHA, the Service will not require any additional or different management activities by the participants without their consent, and they may return the enrolled property to the baseline conditions that existed at the beginning of the SHA. In April of 2024, the Service finalized regulation changes that define a new type of agreement, now known as Conservation Benefit Agreement, which will replace SHAs going forward.

Section 7: The section of the Endangered Species Act of 1973, as amended, outlines procedures for interagency cooperation to conserve Federally listed species and designated critical habitats. Section 7(a)(1) requires Federal agencies to use their authorities to further the conservation of listed species. Section 7(a)(2) requires Federal agencies to consult with the Services to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Other paragraphs of this section establish the requirement to conduct conferences on proposed species; allow applicants to initiate early consultation; require USFWS and NMFS to prepare biological opinions and issue incidental take statements. Section 7 also establishes procedures for seeking exemptions from the requirements of section 7(a)(2) from the Endangered Species Committee (16 U.S.C. 1531 *et seq.*).

Section 7 Consultation: The various section 7 processes, including both consultation and conference if proposed species are involved (50 CFR Part 402).

Section 106: Section 106 of the National Historic Preservation Act of 1966.

Sensitive Species: In this document, we will generally refer to sensitive species, a term we use to encompass the variety of at-risk species in the study areas. This term includes various State and Federal designations such as species of concern, special status species, and sensitive species.

Specialist Species: A species whose ecological strategy relies on adaptation to a relatively narrow range of often stable ecological conditions. The spotted owl is considered to be somewhat of a specialist species, as it is adapted to older forest habitats, and relies substantially on a few rodent species as its primary prey. *See also* **Generalist Species**.

Species of Concern: Federal species of concern is an informal term, not defined in the ESA, and commonly refers to species that are declining or appear to be in need of conservation. States may also use this term.

Spotted Owl Demographic Study Area: Study areas that are part of a long-term monitoring program assessing spotted owl demography. Study areas are located across the owl range and have relatively large sample sizes of spotted owl sites. Ongoing northern spotted owl

demographic study areas referenced in this EIS are the Cle Elum, Rainier, Olympic Peninsula, Oregon Coast Ranges, Tyee, HJ Andrews, Klamath, South Cascades, Hoopa, and Willow Creek (part of the NW California study area). These areas are considered ongoing spotted owl demographic study areas because annual monitoring continues to occur and has occurred on all of these areas since at least 1990, with some sites having been monitored since 1988. California spotted owl study areas are located in Lassen National Forest, Eldorado National Forest, Sierra National Forest, and Sequoia/Kings Canyon National Parks in the Sierra Nevada, and in the San Bernardino National Forest in Coastal-Southern California.

Spotted Owl Site: Any location where resident spotted owls are known to be present, were historically present, or may be present in unsurveyed habitat. Spotted owl sites can be identified through surveys where spotted owls were detected (e.g., USFWS 2012, entire). In cases where survey data are unavailable, spotted owl sites can be identified by 1) conducting surveys, or 2) using a modeling approach that uses habitat and landscape characteristics to identify areas with a high probability of being occupied by spotted owls.

Status Review: A periodic analysis of a [listed] species' status conducted by the Service to ensure that the listing classification of a species as threatened or endangered on the List of Endangered and Threatened Wildlife and Plants (List) (50 CFR 17.11 – 17.12) is accurate. A status review is required every five years by section 4(c)(2) of the Endangered Species Act of 1973.

Suitable Habitat: In this EIS, northern spotted owl nesting and roosting forest conditions as modeled by the 2023 Cover Type Suitability GIS layer (Davis et al. 2024a). Suitable northern spotted owl habitat described in this document includes lands with suitable and highly-suitable nesting and roosting forest cover types as defined by Davis et al. (2022, pp. 8-9).

Survey Protocol: A standardized and often specialized survey method designed for application to certain species, to ensure efficient and scientifically credible results from data collected during those surveys.

Survival: Annual survival (or "apparent survival") is probability that an owl that is alive and present in a monitoring area in one year survives and stays within the monitoring area until the next year (Williams et al. 2001, p. 478). A less technical definition is the probability that a spotted owl will live for at least one more year, following the time it is located as a live animal.

Take: Take is defined differently under different laws. Take of barred owls is specific to the definition of take in the Migratory Bird Treaty Act (MBTA). Take of listed species, including northern spotted owls, is defined under the Endangered Species Act.

Under the MBTA, take means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect. (50 CFR 10.12)

Under section 3(19) of the ESA, take is defined as "To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." per. Harm is further defined by USFWS to include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. (50 CFR 17.3).

Territorial: With respect to barred and spotted owls, describes an individual owl or pair of owls that is repeatedly present in an area (i.e., a territory), and defends that territory from other barred or spotted owls using territorial calls and/or physical confrontation. *See also* **Territory**.

Territory: In barred and spotted owl ecology, an area used by a mated pair of owls or an unmated territorial individual, within which the owl(s) obtain the necessary resources (e.g., prey, shelter, nest sites) to survive and (for pairs) reproduce. A territory is usually defended against members of the same species. With respect to spotted owls, a home range, usually somewhat larger than a territory, may include areas of overlap with adjacent spotted owl territories. A spotted owl core area is typically smaller than, and located within, the territory. *See also* **Core Area, Home Range,** *and* **Territorial**.

Threatened Species: Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, as defined in section 3(20) of the ESA.

Translocation: The movement of an animal to a different area for release into the wild.

Treatment: In an experimental design, a study area or sample subject to some form of experimental manipulation, for comparison with study areas or samples not subject to manipulation, to test a hypothesis regarding the treatment (manipulation) applied. More generally, treatment refers to a management intervention (for example, barred owl removal) applied in order to achieve management goals. *See also* **Control**.

Turnover: The replacement of territorial owls with new individuals of the same species at a given spotted owl territory.

Unacceptable Impacts: Within the National Parks and Monuments, unreasonable interference with an atmosphere of peace and tranquility or the natural soundscape (NPS 2006, Section 1.4.7, p. 12).

Unoccupied Site: Site where spotted owls were detected in the past, but more recent surveys have not detected owls.

UTM (Universal Transverse Mercator): A geographic coordinate system that uses a 2-dimensional Cartesian coordinate system to give locations on the surface of the Earth, and commonly used to identify specific locations during wildlife studies.

Viable Population: A self-sustaining population with a high probability of survival despite the foreseeable effects of demographic, environmental, and genetic stochasticity and of natural catastrophes.

Vital Rates: In wildlife ecology, the rates of reproduction and survival of a species of interest over a period of time, used in the estimation of population growth rates. For demography studies of the spotted owl, vital rates include survival and recruitment.

List of Acronyms and Abbreviations

Acronym or Abbreviation	Name
ARU	Autonomous Recording Unit
BLM	Bureau of Land Management
Cal FIRE	California Department of Forestry and Fire Protection
CBA	Conservation Benefit Agreement
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSO	California Spotted Owl
dB	decibel
DPS	Distinct Population Segment
EIS	Environmental Impact Statement
E.O.	Executive Order
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FMA	Focal Management Area
FMP	Forest Management Plan
FR	Federal Register
GHG	Greenhouse Gas
GIS	Geographic Information System
GMA	General Management Area
HCP	Habitat Conservation Plans
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NPS	National Park Service
NSO	Northern Spotted Owl
OAR	Oregon Administrative Rules
ODF	Oregon Department of Forestry
ODSL	Oregon Department of State Lands
PAM	Passive Acoustic Monitoring
RMP	Resource Management Plan
SHA	Safe Harbor Agreement
SOSEA	Spotted Owl Special Emphasis Area
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WAC	State of Washington Administrative Code
WDNR	Washington State Department of Natural Resources
WOSF	Western Oregon State Forests

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Dedication

The EIS and proposed Strategy are dedicated to **Lowell Diller,** Senior Wildlife Biologist for Green Diamond Resource Company and the original proponent of the need for barred owl management. Lowell's early research on barred owl removal proved the effectiveness and feasibility of the technique and set the standards we use today and include in the Strategy. He is greatly missed.

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Appendix 1: The Barred Owl in Western North America – Invasive Species Evaluation for Barred Owl Management Strategy

The following analysis is specific to the appropriate characterization for the barred owl in the West, specifically within the ranges of the northern and California spotted owls. It should not be considered a policy decision or applied directly to other species or situations, as each situation is unique.

A1.0 Changes between Draft and Final EIS

- Updated the definitions and analyses to conform to the most recent Executive Order on invasive species, E.O. 13751.
- Updated information on the potential effect of climate change on the expansion route for barred owls.

A1.1 Invasive Species Definitions

Direction: Executive Order (E.O.) 13751 (81 FR 88609) was created to prevent the introduction of invasive species, to provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

Question: Is the barred owl in the ranges of the northern and California spotted owl an invasive species as defined under E.O. 13751? To determine the correct characterization under the E.O. 13112, as amended by E.O. 13751, we compare the components and definitions of the Executive Orders to the situation with the barred owl in western North America.

Under E.O. 13751:

> **"Invasive species"** means, with regard to a particular ecosystem, a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health [emphasis added].
>
> **"Non-native species"** means, with respect to a particular ecosystem, an organism, including its seeds, eggs, spores, or other biological material capable of propagating that species, that occurs outside of its natural range.
>
> **"Introduction"** means, as a result of human activity, the intentional or unintentional escape, release, dissemination, or placement of an organism into an ecosystem to which it is not native [emphasis added].
>
> **"Pathway"** means the mechanisms and processes by which non-native species are moved, intentionally or unintentionally, into a new ecosystem.

The Executive Order provides direction to Federal agencies, as follows:

"Sec. 2. Federal Agency Duties. (a) Each Federal agency for which that agency's actions may affect the introduction, establishment, or spread of invasive species shall, to the extent practicable and permitted by law, ...

- prevent the introduction, establishment, and spread of invasive species;
- detect and respond rapidly to eradicate or control populations of invasive species in a manner that is cost-effective and minimizes human, animal, plant, and environmental health risks;
- monitor invasive species populations accurately and reliably;
- provide for the restoration of native species, ecosystems, and other assets that have been impacted by invasive species; . . .

A1.2 Barred Owl History, Impact, and Range Expansion

Barred owls (*Strix varia*) are native to eastern North America and were historically found east of the Great Plains and south of the 49th parallel (Livezey 2009a, p. 53), with a subspecies in central Mexico. Around the turn of the century their range began to expand westward. The barred owl's arrival in the West is a relatively recent occurrence. Based on genetic studies, the spotted and barred owls are distinct species, separated from a common ancestor for a very long time prior to this expansion (Haig et al. 2004, p. 1353; Hanna et al. 2017, p. 2537, 2539).

Spotted owls (*Strix occidentalis*) are native to western North America. The northern spotted owl subspecies (*Strix occidentalis caurina*) is found in British Columbia, Washington, Oregon, and northern California. The California spotted owl subspecies (*Strix occidentalis occidentalis*) is found in the Sierra Nevada and the coastal mountains of southern California, and its historical range extends into northern Baja California, Mexico.

A1.2.1 Barred owl range expansion.

Barred owl populations began to expand westward in the early 1900s (Livezey 2009a, p. 50). The first record of barred owls within the range of the northern spotted owl was in 1959 in British Columbia, Canada. Barred owls established populations, subsequently spreading south (Grant 1966, p. 42). Barred owls were first located in western Washington within the range of the spotted owl in 1972 and the first breeding record was 1974 (Smith et al. 1997, p. 230, Rogers 1966, p. 3). The first record in Oregon was from 1974 and California in 1976, with breeding documented by 1991 (Livezey 2009a, p. 40, 51; Gilligan et al. 1994 p. 321, cited in Mazur and James 2021, p. 5; Dark et al. 1998, p. 53.).

Barred and spotted owl are both forest owls, whose ranges were separated by the relatively treeless Great Plains and harsh conditions in the northern boreal forest, both likely formidable barriers to expansion (Livezey 2009b, entire). Given the limited data and observations from that time period, the mechanism and route that facilitated westward expansion after so many millennia of separation are not documented. Theories point to changes in the conditions on the northern Great Plains and northern boreal forest as probable explanations. These include anthropogenic impacts such as fire exclusion and suppression, bison and beaver extirpation, deer

and elk overhunting, establishment of riparian forests, and extensive planting of trees and shelterbelts in the northern Great Plains and southern edges of northern boreal forests, all of which may have contributed to tree and forest expansion (Livezey 2009b, p. 334). In addition, Central Canada, particularly the Canadian Prairie and the northern boreal forests experienced a continued statistically significant increase in temperatures starting in the late 1800s as CO_2 levels in the atmosphere rose, with pronounced warming periods in the early to mid-1900s (Campbell et al. 1993, entire; Gullett and Skinner 1992, entire; Schindler et al. 1998, p. 157-158).

Livezey (2009b, entire), using strength of evidence analysis, evaluated the plausibility of five ecological or behavioral changes proposed in the literature to have facilitated the range expansion. He concluded that the historical lack of trees in the northern Great Plains acted as a barrier to the range expansion and that increases in forest caused by European settlers excluding fires historically set by Native Americans and planting trees created conditions that allowed barred owls to expand across the previous barrier.

Two potential routes for expansion have been suggested, one across the northern Great Plains and the other through the southern portion of the northern boreal forest in Canada. Each are affected by anthropogenic impacts, and both may have been factors in the expansion of barred owls. Both may have played a role in creating pathways to allow barred owls to invade western forests.

Great Plains Potential Route

The changes brought to the northern Great Plains as a result of European settlement are a likely and reasonable explanation for the breakdown of the barrier (Livezey 2009b, p. 338).

Settlement and homesteading, resulting in the extensive planting and caring for trees (Livezey 2009b, pp. 333-4) including shelter belts around homes and communities and the establishment of woodlots and orchards as part of tree claims under the homestead laws, all leading to significant expansion of small, forested patches on the Great Plains. These patches were often associated with farming, and grain storage which in turn likely lead to an increase with potential barred owl prey in these forest patches. The U.S. Bureau of Forestry reported in 1890 that ‘‘every year the treeless belt becomes narrower through constant planting’’ (as recorded in Droze 1977, p. 16). In Manitoba, some 60 million trees were planted from 1901–1920 as a result of an anti-erosion shelterbelt program (Williams 1989, as cited in Livezey 2009b, p. 333). With the consolidation and intensification of agriculture and the death of planted trees from age and stress, many of these have been lost in recent decades.

The removal of bison and beaver from the Great Plains occurred prior to the expansion of barred owls. Beaver were extensively trapped in the 1800s, including along the waterways that served as major transportation networks for moving hides to the eastern markets. Beaver are very efficient at removing small and large trees alike, particularly in areas where this resource is limited, and could suppress the development of riparian forests along rivers in the Great Plains. Ungulates, including bison, previously occurred in large numbers and may have reduced riparian forest development through mechanical damage and browsing by deer. These changes may have allowed the development of riparian forests along major waterways that cross the Great Plains,

such as the Missouri River system. Cattle grazing and the slow return of beaver, along with the development of extensive reservoirs with highly variable water levels have greatly reduced these riparian forests in recent decades.

Fire reduction resulting from fire breaks created by fallow fields and agriculture, and the cessation of Aboriginal burning, may have allowed forests to develop or expand (Livezey 2009b, pp. 327-330), particularly in areas with sufficient rain to support trees.

Northern Boreal Forest Potential Route

Treeline along the southern edge of the northern boreal forest was affected by the same factors listed above. Extensive tree planting/forest expansion and both direct and indirect fire exclusion/suppression by settlers occurred at the southern edge of northern boreal forests in Canada (Livezey 2009b, p. 327-336, Smith 1996, Houston and McGowan 1999, pp. 190-191).

Conditions within the northern boreal forest have also likely changed with the early effects of climate change. There has been a general warming trend since at least 1860 in Canada, including in the northern boreal forest. This warming trend may have begun at the end of the last mini-ice age, but likely increased as a result of anthropogenic factors resulting in an increase in greenhouse gases in the atmosphere (Campbell et al. 1993, p. 336; Gullett and Skinner 1992, entire; Schindler et al. 1998, p. 157-158). The period from the late 1800s through the 1940s experienced a pronounced warming trend in Central Canada especially in the northern boreal forest and Canadian prairie, with the 1930s to 1940s being particularly warm. (Schindler et al. 1998 p. 157-158; Gullett and Skinner 1992, entire). While the northern boreal forest structure did not substantially change as a result of climate changes in the past 100-150 years (Campbell et al. 1993, p. 336-337), small changes in the general or extreme temperatures may have allowed barred owls to survive and reproduce in the southern portion of the northern boreal forest where they had not previously existed.

Monahan and Hijmans (2007, p. 61) concluded that the warming trend in the mid-1800s that coincided with barred owl range expansion supported the conclusion of a natural range expansion. However, more recent climate change research (Abram et al. 2016, entire), which evaluated other potential causes of the warming trend in the mid-1800s, indicates there is substantial and well documented evidence that effects of human-caused climate change on temperature (i.e. the beginning of the human-caused warming trend on oceans and continents) began in the 1830s and was most pronounced in the tropical oceans and the continental Arctic area of North America at that time; and a significant, sustained, human-caused warming trend in the northern hemisphere emerged in the mid-1800s. The IPCC notes that human-caused climate change began in the mid-19th century (Arias et al. 2021 p. 60). The weight of the evidence and best available science supports that warming temperature trends in North America (including the boreal forest) in the mid to late 1800s and in the 1900s was the result of human-caused climate change.

Therefore, if barred owls utilized the northern boreal forest for their range expansion, the changes that allowed for this were most likely human-caused or -facilitated.

Current Range of Barred Owls

Barred owls now occur throughout virtually all of the northern spotted range, and in high to very high densities throughout most of the range throughout most of the northern spotted owl range (Wiens et al. 2021, p. 7; Gutiérrez et al. 1995, p. 3; Crozier et al. 2006, p. 761).). Within the California spotted owl range, barred owls have been documented as individuals and small populations in the Sierra Nevada within the California spotted owl range (Keane et al. 2017, p. 207-208; Keane et al. 2018, p. 5)

A1.2.2. Impact of Barred Owls on Western North American Biota

Competition from barred owls had been identified as one of primary threats to the survival of the northern spotted owl, with increasing urgency (USFWS 2004, p. 43; USFWS 2011, p. II-4, III-62; Franklin et al. 2021, p. 9-19; Yackulic et al. 2019, p. 1, 4-5; Davis et al. 2022, p. 1). Most recently, authors have concluded that failure to reduce barred owl populations will likely lead the extirpation of the northern spotted owls the near future (Franklin et al. 2021, p. 19; Wiens et al. 2021, pp. 7-8; Yackulic et al. 2019, p. 1, 5). Competition from barred owls has been identified as a significant threat to the California spotted owl and is expected to increase in magnitude without management of invading barred owls (88 FR 11600, at 11619).

Barred owls are generalists, consume a much wider variety of prey than spotted owls, and can develop higher density populations (Baumbusch 2023, entire). Therefore, they are not an ecological replacement for spotted owls. The increasing populations of barred owls are likely impacting native species that are evolutionarily naïve to its presence, through predation or competition for prey (Baumbusch 2023, pp. 135, 137; Holm et al. 2016, entire). Unfortunately, we do not have sufficient monitoring data for these species to verify species-specific effects in most cases. Data on the diet of barred owls in the West includes groups that contain at-risk or listed species (Baumbusch 2023, p. 23; Kryshak et al. 2022, p. 7), including, but not limited to, small mammals, amphibians, reptiles, and other birds (Baumbusch 2023, pp. 135, 137). Studies have documented predation on red tree voles, a candidate for listing under the Endangered Species Act (Baumbusch 2023, p. 23-25), and heavy predation on amphibians, a group that includes several at-risk endemic species. Additional groups found in barred owl prey studies that contain some listed and protected species or populations include mountain beaver, crayfish, and birds.

Even for prey species not currently at risk, the density and high energetic requirements of barred owls may lead to significantly greater pressure on these species and potentially unsustainable levels of predation (Baumbusch 2023, p. 30-31, 135). Scientists have expressed concern that the barred owl's breadth of prey and intensity of use could lead to cascading effects on the ecosystem and its food webs (Holm et al. 2016, entire). This could affect not only spotted owls, but entire ecosystems.

A1.3. Barred Owls in the Western US and the Invasive Species Definition

Under E.O., 13751: "Invasive species" means, with regard to a particular ecosystem, a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health [emphasis added]. We address these elements individually.

"With regard to a particular ecosystem": For the purposes of this analysis, we are addressing the presence of barred owls in the ecosystems defined by the ranges of the northern and California spotted owls. These include the forests of western Washington, western Oregon, and California.

"Non-native organism" -- an organism, outside of its natural range: Barred owls did not historically occur in the western United States. They were historically found in eastern North America, generally east of the Mississippi River, with a subspecies in central Mexico, separated from the western United States by the Great Plains and arid parts of the American southwest and northwestern Mexico. Barred owls were first reported in the range of the northern spotted owl around 1959 in British Columbia.

Barred owls have long been one of the most common, easily recognizable, and vocal owl species in the eastern forests of North America, with a distinctive 'who-cooks-for-you' call that carries over long distances in the forest. They have an easily identifiable appearance, and are conspicuous and territorial, even to humans. It is very unlikely that barred owls had been overlooked in the West prior to the turn of the 20th century or in the range of northern spotted owl in the mid to late 1900s. Given the apparent rapid and recent impact of barred owls on northern spotted owl population demographics over the last few decades, there is little chance that barred owls have been in contact with northern spotted owls for much more than 50 to 70 years.

"Introduction" means, as a result of human activity, the intentional or unintentional escape, release, dissemination, or placement of an organism into an ecosystem to which it is not native.

An introduction does not require the intention to move a species to a new ecosystem. It can be the result of creating the habitat or conditions necessary that allows a species to move or expand across what was previously a barrier to such movement. For example, building a bridge between two islands, thereby allowing terrestrial species to cross the previous water barrier is an "introduction". E.O. 13751 includes a definition of pathways as mechanisms and processes by which non-native species are moved, intentionally or unintentionally, into a new ecosystem.

The expansion of barred owls into the West is likely the result of a breakdown of the barrier previously established and maintained by conditions in relatively treeless conditions in the northern Great Plains and harsh weather of northern boreal forest, as described above, creating a pathway for movement of barred owls westward. "Pathway" means the mechanisms and processes by which non-native species are moved, intentionally or unintentionally, into a new ecosystem. Therefore, this expansion represents release or escape from previously range limitations created by the above barriers, allowing barred owls to spread into the forests of the West.

Human actions, in particular changes brought to the northern Great Plains and northern boreal forest as a result of European settlement and potential effects of early anthropogenic climate change on winter conditions in these areas are the most likely and reasonable explanations for the breakdown of the barrier and creation of a pathway, as described above.

"Causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health": Barred owls have been identified as one of the two primary threats to the survival of northern spotted owls (USFWS 2011, p. II-4, III-62) and a significant threat to the persistence of California spotted owls (88 FR 11600). There is a high potential for other species being adversely affected by this new predator through direct predation or competition for prey, including other listed species or species at risk. Barred owls have the ability to exist in dense populations, which increases the impact on even common species.

A1.4. Conclusion

Based on the summarized information above, we conclude that the barred owl in western North America meets the definition of an invasive species in E.O. 13751. The barred owl is a non-native species, not historically present in the range of the northern and California spotted owls. Barred owls were introduced unintentionally through dissemination across the previous barriers to movement of this forest owl created by the generally treeless conditions of the Great Plains and harsh conditions of the northern boreal forest. This movement was made possible by human-caused changes to the northern Great Plains and northern boreal forest. Barred owls are causing significant environmental harm to northern spotted owls, a subspecies listed as threatened under the Endangered Species Act (ESA), and are likely to cause significant harm to California spotted owls, a species proposed for listing under the ESA, as barred owl populations continue to expand. They are likely harming other species on which they prey and are considered a risk to create a trophic cascade in some forest systems.

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Appendix 2: Methodology for the Removal of Barred Owls from the Proposed Barred Owl Management Strategy

The following is the protocol developed for removal under the proposed Barred Owl Management Strategy (Strategy), including documentation requirements for designation as an implementer and removal specialist. It would apply to all implementers involved in lethal removal the Strategy as well as the capture and euthanize option.

The U.S. Fish and Wildlife Service (Service) intends that any removal of barred owls for purposes of the Strategy and associated Migratory Bird Treaty Act (MBTA) permit would be conducted in a professional manner using methods that are safe, humane, and effective while meeting the need to reduce barred owl populations in treatment areas. We adopt the following guidelines and protocols to ensure that barred owl removal meets this intent through appropriate consideration of methods, timing, and safety. The included removal methods would ensure humane treatment of all affected barred owls. Every effort would be made to minimize the risk of unnecessary injury or trauma to barred owls or non-target species.

Barred/spotted owl hybrids may also be removed, as they have the same impact on spotted owls as barred owls, though this is not required. Implementers may choose to leave hybrids extant. Because visual identification of hybrids is more difficult, particularly at night, there is a specific protocol for the identification of hybrids prior to removal (See Section A2.3.3).

Minor changes to this methodology may occur during the implementation of the Strategy if information and experience justify such changes to make removal safer or more effective, while maintaining the intended high standards for humane and ethical treatment of affected animals. Any proposed changes would require approval by the Service prior to their adoption and implementation. These guidelines and protocols, as presented here, apply specifically to actions conducted under the Strategy, but may be used or adapted to other projects following any needed environmental review of those future projects.

A2.0 Changes between Draft and Final EIS

- Clarified the requirement for removal specialists to have firearms safety training.
- Added recommendations for the timing of barred owl removal, where practicable, to reduce the injury or death of dependent barred owl young.
- Added a requirement to avoid shooting in marbled murrelet nesting habitat in the two hours before and after dawn during the murrelet nesting season.
- Clarified that removal specialists may remove fledgling and juvenile barred owls if they can be positively identified.
- Clarified the requirement for the presence of two trained specialists or observers for removal of hybrid spotted and barred owls and to submit the carcass for genetic testing.

A2.1. Requirements for designation as an implementer.

To receive designation as an implementer for actions under the Strategy, requesting entities must provide the following information.

A2.1.1 Information for specific removal efforts:

For barred owl removal in the range of the northern spotted owl (excluding Marin and Sonoma County and the California Cascades Province), before beginning barred owl removals, each individual or group designated to implement the Strategy must submit the following information:

- Maps of the approximate area where barred owls will be removed, preferably in the form of geospatial data (e.g., a geodatabase), but paper or electronic maps would also be acceptable, as long as the maps provide adequate reference points. These maps should also include locations of primary human dwellings, established open campgrounds, and other locations with regular human use, showing the 0.25 mile no-shooting buffer zone around these areas, and locations of known spotted owl sites.
- A list of veterinary resources and wildlife rehabilitation facilities and specialists to be contacted in case of accidental injury of non-target wildlife.
- A list of requested individuals to be designated as removal specialists. These individuals must be approved by the Service as the permit-holder, prior to any removal work.

For barred owl removal in Sonoma or Marin County, or within the California spotted owl range or potential invasion pathways (including the California Cascades Province in the northern spotted owl range):

- A general map or description of the areas where barred owl removal may occur. This can be at a regional or county scale.
- A list of veterinary resources and wildlife rehabilitation facilities and specialists to be contacted in case of accidental injury of non-target wildlife.
- A list of requested individuals to be designated as removal specialists. These individuals must be approved by the Service as the permit-holder, prior to any removal work.

Any proposed changes to the above information must be submitted with the annual report. Changes in in the boundaries of the barred owl removal area may be updated at any time, but must be approved by the Service prior to implementation.

A2.1.2 Information required for designation as a removal specialist:

Prior to being designated as a removal specialist authorized to remove barred owls under the Strategy, each individual requesting designation must provide documentation of training or experience in the following areas. The Service will review the request and may ask for additional information. The Service reserves the right to determine who would be designated as a removal specialist under the Service MBTA permit.

- Barred owl and spotted owl identification, using visual and auditory means.
- Firearm Safety Training.
- Firearm skill and accuracy.
- Understanding of the methods for removing barred owls with firearms.
- Barred owl handling and human field euthanasia methods.
- Experience with barred owl removal.

Experienced removal specialists should ensure that their documentation includes:
- Total number of years and dates of previous removal experience.
- Number of barred owls removed.
- Number of barred owls injured and not recovered.
- Any injury to non-target wildlife.
- To demonstrate understanding of the protocol, describe at least one situation where they decided not to shoot the target bird, or if that situation has not occurred, a hypothetical situation in which they would not shoot an owl.

Individuals who have received training but have not yet conducted independent barred owl removal should ensure that their documentation includes:
- The name of the trainer who provided training in barred owl removal methodology.
- Dates on which they observed at least three separate successful barred owl removals by the trainer.
- Dates on which they identified and successfully removed at least four barred owls under the supervision of the approved trainer.
- Documentation that the trainer has certified them as being ready for independent removal.

Changes in personnel wishing to be designated may be updated at any time by requesting addition or removal of individuals as removal specialists and submitting the information describing their qualifications as described above. The Service must approve the request before the individual is authorized to remove barred owls under the Service's MBTA permit. The Service reserves the right to disapprove a proposed removal specialist for any reason. Any removal specialist found to violate the protocol may have their designation revoked. The Service reserves the right to conduct field visits at any time to observe any barred owl removal conducted under the Strategy.

A2.2. Considerations Prior to Conducting Removal Activities

Prior to initiating removal, any preliminary monitoring required for the permit should be completed (See Appendix 5.1.1. of the Strategy).

A2.2.1. Timing of Barred Owls Removal

Removal of barred owls may occur at any time of the year. However, we recommend focusing activities before and during the barred owl nesting season (early spring through mid-summer), and in the fall. Past studies have demonstrated that barred owls are easier to locate and remove during these periods.

To reduce injury and death of dependent young, we recommend, but do not require, the following:

- initiate barred owl removal on management areas in the fall, where practicable. This reduces the population at a time when there are no dependent young. However, these areas may be recolonized quickly, requiring additional removal the following spring.
- initiate removal as early as possible in the spring, prior to barred owl nesting and the hatching of eggs, where practicable. This is a very effective time for removal, opening sites to potential colonization by spotted owls prior to their breeding season and reducing pressure on any nearby occupied spotted owl sites for nesting. The time of nest initiation and egg hatching will vary across the range of the Strategy, therefore implementers should use the best available information for their areas in defining these dates.
- If barred owl nests are found during the period when they are likely to have dependent young, consider delaying removal of the adults until the young can be removed or are independent, if practicable.
- If fledgling barred owls are located with adults, or have acquired adult feather characteristics, remove young prior to removing adults.

To reduce the potential to disturb marbled murrelets during critical nesting and feeding periods, no shooting is allowed within 0.25 miles of marbled murrelet nesting habitat during the marbled murrelet breeding season for the two hours before and after dawn. Marbled murrelet nesting habitat definition can be found in the most recent marbled murrelet inland survey protocol (Pacific Seabird Group 2024) or by checking with the USFWS prior to initiating removal efforts.

A2.2.2. Identification of Barred Owls Prior to Removal

Positive identification of barred owls prior to removal must be confirmed by either two individuals (removal specialist and a trained observer) or by a single removal specialist ideally identifying the bird by both visual and auditory cues. In the absence of auditory cues, barred owls may be removed by visual identification only **if** an experienced removal specialist has a clear and unobstructed view of the owl and is able to detect multiple components of the species' characteristics. Note that barred owls in the West may exhibit muted visual characteristics such as the extent of barring on the front chest. If there is any doubt about the species identification, no removal attempt shall occur, and a new attempt may be conducted at a later time.

Fledgling and juvenile barred owls may be removed **if** they can be positively identified as barred owls, such as older juveniles with developed chest and abdominal contour feathers. Young birds in the nest and/or direct contact with adult barred owls may also be taken. As with adults, if there is any doubt as to their identification, no removal attempt shall occur, and a new attempt conducted at a later time.

Persons participating in removal activities must be able to accurately identify spotted owls and barred owls using both visual and auditory means, and confidently distinguish between the two species. Individuals not experienced with such identification must receive training and testing

in owl identification prior to removal activities (see training section below). Individuals who have not completed at least a year of removals or over 25 removals would need to receive testing on owl identification.

A2.2.3. Preparation for Injury of Barred Owls or Accidental Injury of Non-Target Species

While the protocol is designed to substantially avoid injury to non-target species, such injury may still occur. Prior to conducting barred owl removal activities, parties responsible for removal shall identify veterinary resources and wildlife rehabilitation facilities and specialists within reasonable transport distance of the removal sites. Those involved in removal should have contact information available during field work. Removal specialists should be aware of appropriate handling techniques for safe and humane transport of injured animals to rehab facilities and have any needed equipment (e.g., carriers).

Any barred owls wounded, but not killed, during removal shall be humanely euthanized using methods approved by the Service or by the American Veterinary Medical Association, where possible. All people involved in removal should be trained in effective, humane methods of field euthanasia and have all the necessary material available at all times during removal.

A2.3. Guidelines and Precautions for Lethal Removal

The following guidelines are designed to minimize the risk of nonlethal injury or suffering of barred owls, or the injury or death of non-target species, during lethal barred owl removal, while ensuring the safety of field personnel and the public.

A2.3.1 Lethal Removal Methods

When setting up the location for barred owl removal, reasonable effort should be made to limit the shooting distance to no more than 30 yards to minimize the risk of nonlethal injury or prolonged death. Removal specialists should seek a removal location that offers multiple unobstructed perch sites with clear shooting opportunities within the preferred distance of 20 to 30 yards prior to attempting to attract the barred owl into shooting range.

Barred owls will be lured to the removal specialist using an amplified megaphone, or similar device, to broadcast digitally recorded barred owl calls, alternating with listening for responses. The calls and mix of calls are at the discretion of the removal specialist, but generally include single-note hoot, 2-phrase hoot, ascending hoot, and pair duet calls. Generally, removal specialists will call for about 15 minutes at a location before moving on if no barred owls are heard. However, conditions or topography may require a longer period, at the discretion of the specialist. If barred owls are heard, calling may continue intermittently as long as there is some potential for the barred owl to be lured in. The specialist may also relocate to better access the barred owl.

For area-based removal, calling stations should be located about ¼ to ½ mile apart, taking advantage of topographical features to cover the forest lands within the area. For efforts to locate and remove previously reported barred owls, multiple calling stations may be required to find the barred owls for removal.

Before any removal, positive identification of the barred owl is required, confirmed by either two qualified observers (two qualified removal specialists or one specialist and one individual skilled in owl identification) or by a single qualified removal specialist identifying the bird by both visual and auditory cues. Barred owls may be removed in the absence of vocalizations, but only if the observer has a clear and unobstructed view of the front of the owl and is able to detect multiple components of the species' characteristics.

If spotted owls are detected in the immediate vicinity of barred owls, it may become difficult to "track" individual birds, especially during agonistic encounters between the two species. Unless the barred owl can be "pulled" at least one-half mile away from the spotted owls, lethal removal at that location shall be postponed to a later date to minimize the risk of accidental injury or death of a spotted owl, either from removal or inter-species encounters. If a second observer is available who can keep track of the spotted owl, the removal effort can continue as long as the spotted owl's location remains known.

To avoid disturbing nesting spotted owls, removal should generally not occur within 300 yards of a known active spotted owl nest during the critical breeding period for spotted owls (March 1 to July 31, or as established locally). To avoid drawing barred owls close to an active spotted owl nest, we recommend that any barred owl removal location be at least 0.25 miles from known active spotted owl nests, and in a direction that would not pull the barred owls towards the spotted owl nest.

Lethal removal shall be done by shotgun of 20 gauge or larger bore, using non-toxic lead-substitute shot **(**e.g., Hevi-shot, steel). Lead shot may not be used. Rifles, pistols, or other firearms or methods are not authorized under this protocol unless explicitly approved by the Service for specific situations or occasions. "Quiet" shotguns (e.g., shotguns modified to reduce noise) may be used to reduce impacts to wildlife or humans, if allowed under State or local agency rules and regulations. Before initiating removal efforts, and periodically during the season, removal specialists should test the pattern and distance characteristics of their gun to ensure they know the capabilities of the gun and loads. We recommend that shotguns be equipped with an attached night scope or other gunsight designed specifically for night use for accurate and precise aiming in dark or low light conditions (e.g., red dot sight mount).

All shots must be directed at barred owls which are **stationary** on an unobstructed perch and present a full, frontal and unobstructed view. On-the-wing shots are not authorized under this protocol.

If barred owls are wounded, but not killed, every reasonable effort shall be made to locate any injured barred owls and euthanize it quickly and humanely. All personnel must be trained in field euthanasia and carry the needed equipment at all times during any removal attempt.

Any injury or death of a non-target species must be immediately reported to the designated Service contact. Any injured animals other than barred owls should be transported to a licensed rehabilitation facility. In addition to the immediate reporting to the Service contact, the circumstances surrounding such unintended injury or death must be described in a written incident report sent to the designated Service contact within 3 business days of the incident; this information must also be included in the annual report. If the non-target species is a listed threatened or endangered species (e.g., spotted owl) no further removal activities may be conducted until the Service reviews the incident report and authorizes such activities to resume.

In situations where firearms cannot be used or their use is inadvisable due to safety concerns, local regulations, or the density of human habitation, removal specialists may capture and euthanize barred owls, see Section 2.4 for additional details.

Carcass Recovery and Disposition: Reasonable effort should be made to retrieve barred owl carcasses immediately after the shot while allowing for safety considerations, particularly at night in rough terrain. If the carcass cannot be located at the time of shooting, the removal specialist should return to the site as early as feasible the next day to resume the search. If the carcass cannot be located within a reasonable time, the removal specialist will describe the situation on the data card, including any information regarding the likelihood that the shot may have missed, or that the bird was injured and escaped. Any such incident reports will be appended to the annual report for the project.

The following data must be recorded for each carcass:

> Removal date and time, removal specialist's name, specific location (Universal Transverse Mercator (UTM) coordinates are recommended), name of other persons assisting or observing, and permit number under which the specimen was collected.
>
> To improve our understanding of barred owl populations, the following physical measurements should be taken from the carcass if possible: body mass, foot-pad length, and sex (if known) (Baumbusch 2023, pp. 85, 113). This information allows estimation of the body condition of the barred owl.
>
> For each carcass recovered, three photographs of the carcass are required – 1) the front – including head, chest, and tail, including a clear view of the lower abdomen; 2) the underside of the tail, flared out; and 3) the underside of the spread wings to allow aging of the specimen. If a carcass could not be safely recovered, this should be noted on the data form.

Once the data and photographs are collected, the carcass should be "buried" on site by placing under duff, branches, or logs to secure the carcass without disturbing the soil. The location should be out of sight of roads, trails, or human habitation. If this is not possible or advisable, carcasses may be transported to an appropriate disposal facility. If transported from the removal site, carcasses must be tightly double bagged to avoid spread of disease. Carcasses

may also be transmitted to an entity that has indicated interest and holds the appropriate MBTA and State permits to receive or dispose of the specimen and who have indicated with an official letter their interest in accepting the donation.

A2.3.2 Safety

Lethal removal involving firearms is inherently dangerous; more so under the evening or darkness conditions likely to be optimal for barred owl removal. The safety of the public and the persons involved in the activities is of utmost importance. Therefore, the following measures must be employed to ensure the safety of all involved.

All personnel involved in lethal removal must have received firearm safety training and demonstrated skill, accuracy, and precision with the shotgun to be used prior to conducting removal activities. Accuracy is critical to avoid wounding barred owls. Training should cover shotgun use and protocol, along with the ethical, logistical, and safety considerations of conducting the removal. Removal specialists or their employers are responsible for obtaining firearms safety training.

Removal specialists are responsible for obtaining all applicable State, Tribal, and Federal licenses and permits necessary for possession and use of firearms, and for their transport to and from the study area. Removal specialists are responsible for meeting all safety and operational requirements pertaining to those permits.

Removal specialists must observe all laws, regulations, ordinances, (including State, Tribal, and local, as applicable) and site-specific requirements regarding use of firearms on public lands, near human habitation, within parks, etc. At a minimum, we require a no-shooting buffer zone of 0.25 mile around occupied dwellings, established open campgrounds, and other locations with regular human use. Prior to and during removals, the removal specialists or observers must assess the area for potential human presence (homes, tents, vehicles) and appropriate buffers must be applied.

Individual landowners or managers may establish other requirements based on their knowledge of particular conditions or areas within the study area. Where conflicts with other human uses may occur, the removal specialists should attempt to draw the barred owls away from such situations to favorable removal locations through well-planned calling. A “silent” or other legal sound-suppressed shotgun may be used in areas where people may be disturbed if these are allowed under State, Tribal, and local laws or with the appropriate permits.

Appropriate local law enforcement, and agency law enforcement for the lands on which removals will occur, should be contacted prior to field work to minimize public concerns over nighttime discharge of firearms, or their use in areas where they are generally prohibited (e.g., parks), thus avoiding unnecessary law enforcement response. Coordinate with State, Tribal, and Federal agency biologists for the area where the removal will occur. Consider contacting local landowners to minimize public concern. No removal may be conducted in any area without the permission of the landowner on which the removal occurs.

A2.3.3 Lethal Removal of Hybrids

Hybrids between barred owls and spotted owls are generally rare and obvious hybrids are not commonly encountered. Hybrids are not specifically the focus of this Strategy but have the same effect on spotted owl populations and may be removed under this Strategy and protocol. Many first-generation hybrids (one parent of each species) do exhibit physical or vocal characteristics (or both) intermediate to the parent stock, but even these characteristics may be difficult to identify under removal conditions. Second or third generation back-cross individuals (e.g., cross between a hybrid and a barred owl) are difficult to detect even in hand and usually closely resemble the non-hybrid parent.

Since the prescribed method for lethal removal does not provide an opportunity to inspect the individual "in hand" prior to the commitment to remove, identification will rely on a reasonable consideration of observational evidence under field conditions. All removal of hybrids requires two individuals, including at least one removal specialist, both of which are specifically trained or experienced in the identification of hybrids. **If in doubt, removal specialists shall not remove the individual owl until additional follow-up can verify its identification as a hybrid.** If an owl is identified as a hybrid based on field characteristics, it may be removed with appropriate protocols ensuring the identity of the individual. We anticipate that most second-generation and later-generation hybrids that back-cross with barred owls will appear in the field as barred owls and will be removed as such.

Given the difficulty in identifying hybrids, inadvertent lethal removal of even a first-generation hybrid may occur and the hybrid characteristics may not be evident until the specimen is in hand. If an owl carcass appears to be a hybrid once in hand, the specimen should be tagged for future analysis. All confirmed incidences of the removal of hybrids should be reported to the Service as part of required annual reports. These are not considered a take of spotted owls.

A2.3.3.1. Identification of Hybrid Owls Prior to Removal

Identification of hybrid owls requires both visual and auditory observations. If there is any possibility that it could be a spotted owl, the bird must not be removed. The following identification protocol is specific to the removal of suspected hybrid owls. It is focused on insuring that spotted owls are not removed by accident but accepts a higher risk for barred owls to be removed, even if initially identified as hybrids. Hybrids are very uncommon in most areas, and removal specialists may have little experience with their identification. Therefore, we require two individuals (removal specialist and a trained observer) make a positive identification prior to removal. It may be worth waiting until an expert with experience of hybrid owls can verify the identification.

Visual identification of hybrids in the field can be very difficult, particularly at night when most removal occurs, so visual identification alone is not adequate for removal of suspected hybrid owls. The defining visual features for hybrids vary across specimens and are understandably more subtle in nature than the difference between the two species. The focus of this identification is to ensure that spotted owls are not identified as hybrids. While visual identification alone of a free ranging owl is often insufficient to positively verify a hybrid

individual, it is still an important part of the identification protocol. Before removal, the shooter must observe a frontal view of the bird to eliminate the possibility that the targeted bird may be a spotted owl.

To ensure the suspected hybrid owls are correctly identified, the observers must hear the bird use a territorial defense song (e.g., 8-note hoot or descending hoot of the barred owl) numerous times (at least 6). The observer must hear multiple complete calls before making a decision to remove the hybrid.

If a suspected hybrid uses a standard barred owl territorial defense song eight-note hoot (sometimes called two-phrase-hoot = who-cooks-for-you who-cooks-for-you-too) and shows some definitive evidence of barred owl plumage characteristics, it can be removed per the barred owl removal protocol. Examine the specimen in hand and if there is any question, note this in the records.

If a bird **at any time** uses a typical spotted owl territorial defense song (4-note - hoot, hoot-hoot hoooooot) in its repertoire, then it may be a spotted owl. It is critical to realize that individual spotted owls do not always use the complete standard hoot. For example, individuals have been known to consistently drop the first note or add a tag note at the end, and different parts of the call attenuate at different rates over distance. **If there is any question as to whether the bird may be a spotted owl, no removal shall occur.**

If a bird gives multiple complete territorial defense song calls while visible, none of which can be clearly classified as typical spotted owl calls, the calls sound like a mix of barred and spotted owl characteristics, and the bird shows some definitive evidence of barred owl plumage characteristics, the bird may be removed. Examine the bird in hand for hybrid features.

All suspected hybrids should be recorded prior to removal, if it can be done without interfering with the positive identification of targeted owls in the field. While this is not required, it will assist in developing more definitive methods for identifying hybrid owls. All other aspects and requirements of barred owl removal apply to removal of hybrid owls.

A2.3.3.2. Hybrid Owl Carcasses

All suspected hybrid carcasses will be tested for genetic confirmation. Carcasses may be frozen and sent to the USFWS or other qualified lab for genetic testing, and the result shared with the USFWS.

Given the difficulty in identifying hybrids, inadvertent lethal removal of even a first-generation hybrid may occur and the hybrid characteristics may not be evident until the specimen is in hand. If an owl carcass appears to be a hybrid once in hand, the specimen must be tagged for future analysis. All confirmed incidences of the removal of hybrids must be reported to the Service as part of required annual reports. These are not considered a take of spotted owls.

A2.4. Guidelines and Precautions for Capture and Euthanasia

While most removal will involve lethal removal in the field, there may be occasional situations where firearms cannot be used. In those cases, the owls may be captured and euthanized. We do not recommend this as a primary removal method as it includes added stress for the barred owls.

The following guidelines and precautions apply specifically during nonlethal removal of barred owls. They are designed to minimize the risk of injury, excessive stress, or suffering of barred owls during capture or the injury or death of non-target species.

A2.4.1. Live Capture Methods

Capture would be accomplished using techniques that minimize the risk of injury or mortality to barred owls, yet prove effective in capture. Any technique must be designed to secure the barred owl quickly, with the minimum potential for injury, and be approved by the Service.

Any captured animal must be removed immediately from the capture device. Personnel responsible for barred owl capture must be trained and experienced with the capture technique. When deployed, capture devices must be attended at all times by a person trained in the employed capture method. Euthanasia may be conducted immediately upon capture, or barred owls may be moved to a better spot for euthanasia, as long as this occurs as quickly as practicable after capture.

Any non-target species inadvertently or incidentally captured during the attempted capture of a barred owl must be inspected for injury and, if uninjured, released immediately at the capture site. Injured animals should be transported to a licensed rehabilitation facility immediately. Any injury or death of a non-target species must be immediately reported to the designated Service contact and a written incident report sent to the designated Service contact within 3 business days of the incident; this information must also be included in the annual report. If the non-target species is a listed threatened or endangered species (e.g., northern spotted owl) no further removal activities may be conducted by the designated entity until the Service authorizes such activities to resume.

A2.5 Training and qualifications.

All individuals conducting removal under the Strategy will be required to provide documentation of their experience or training to the Service, or the Service's designated representative, for the Service's approval. This should cover the following areas:

1. Barred and spotted owl identification, using visual and auditory means.
2. Firearm skill and accuracy.
3. Understanding of the methods for removing barred owls with firearms
4. Barred owl handling and humane field euthanasia methods
5. Experience with barred owl removal.

For individuals experienced with the removal of barred owls, the above information will be sufficient. This should include the number of years (and dates) of removal experience, number of barred owls removed and of any barred owls injured and not recovered, and any injury to non-target wildlife. To evaluate the individual's understanding of the protocol, they must

describe at least one situation where they decided not to shoot the target bird or if a real-life example is not available, describe a hypothetical situation in which this might take place.

For individuals not experienced with the removal of barred owls, include documentation of the following training:

1. Barred and spotted owl identification. This will be part of the classroom and field training and include a visual and auditory owl identification test. Specific training in the identification of hybrids is required for authorization to remove hybrids.
2. Firearm use, including shooting from various distances, and angles, shots taken at 20 to 25 yards, and using a target the size and shape of a Barred Owl with identified kill zones.
3. Training in the ethics of conducting lethal removal, including when to walk away and skill in the use of rapid and approved euthanasia methods for barred owls.
4. Understanding of the removal protocol and equipment, including
    a. equipment requirements and safety check;
    b. assessing surroundings and potential nearby human presence prior to any collection activity at a given location (i.e., dwellings, hiking trails, tent campers);
    c. determining if spotted owls may be nearby;
    d. selection of favorable removal locations, placement of callers, and call sequences
    e. criteria for taking a shot or deciding when to walk away
    f. data collection, including use of equipment and information/photos required.
5. All inexperienced personnel requesting barred owl removal authorization must obtain experience with identification and removal of barred owls in the field under the direct supervision of an approved trainer experienced in barred owl removal methodology. This includes:
    a. Observe at least 3 separate successful barred owl removals by an approved trainer.
    b. Correctly identify and successfully remove at least 4 barred owls under supervision of an agency-approved trainer.
    c. Be certified by the trainer as ready for independent removal. The trainer may require more removals for a particular trainee if the trainer feel the trainee needs more experience to effectively and carefully conduct the activity.

The Service retains the right to require additional training or documentation, and to refuse to qualify individuals to operate under the Service MBTA permit at our sole discretion.

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Appendix 3: Calculation of Barred Owl Population and Removal Numbers

A3.0 Changes between Draft and Final EIS

- Revised the approach to calculating the potential number of barred owls removed based on changes to the implementation schedule.
- Correction of barred owl population estimates where over estimated.

Most of the range of the northern and California spotted owls has not been surveyed for barred owls using a protocol that supports a precise estimate of the number or density of territorial barred owl sites over this landscape. Conditions differ between the subspecies ranges; therefore, barred owl density and potential removal are calculated differently. We used the following approach to estimate the number of barred owls removed under each alternative, and to estimate the barred owl population in each area, province, the West Coast, and rangewide for the analysis of potential effects on barred owls.

A3.1 Northern Spotted Owl Range

Four study areas associated with the Barred Owl Removal Experiment (USFWS 2013, Section 4.1) provide specific data on territorial barred owl densities, derived from barred owl specific surveys conducted on the control areas in each study area (where barred owls were not removed). This provides data for the Eastern Washington Cascades province (Cle Elum Study Area), Oregon Coast Ranges province (Oregon Coast Ranges Study Area), Oregon Klamath province (Union/Myrtle-Klamath Study Area) and the California Klamath Province (Willow Creek Study Area) (Table A3-1).

Territorial barred owl density data from these study areas were extrapolated across the province in which they lie. For provinces without past barred owl surveys, we extrapolated from the known barred owl site density estimates in Table A3-1. We used data from the most similar study area to estimate the number and density of barred owls on forest lands for the provinces in the range of the northern spotted owl (Table A3-2) and on barred owl management areas in each alternative, adjusting where necessary due to substantially different conditions or history. These results represent our best estimate of the initial number of territorial barred owls within the area potential subject to management under each alternative.

Table A3-1. The estimate of the density of territorial barred owls on study areas with extensive barred owl surveys, on areas without barred owl removal. This does not account for floaters or dispersing barred owls.

Study Area	Physiographic Province	Control Area Acres	Estimated Number of Territorial Barred Owls in Control Area for Highest Year	Number of Territorial Barred Owls Detected per 1,000 Acres
Cle Elum	Eastern Washington Cascades	134,672	182	1.35[1]
Oregon Coast Ranges	Oregon Coast Ranges	219,924	635	2.89[1]
Union/Myrtle-Klamath	Oregon Klamath	150,734	384	2.55[1]
Willow Creek	California Klamath	56,241	31	1.19[2]

[1] For the Cle Elum, Oregon Coast Ranges, and Union/Myrtle Study Areas. territorial barred owl densities were estimated for the years 2021-2023 using extrapolation of the linear annual time trend from the survey years (Wiens pers comm. 2023).
[2]For the Willow Creek, the estimate represents adjusted territorial barred owl densities from 2019, the last year of barred owl surveys on the study areas. (Franklin pers comm. 2023).

Table A3-2. Physiographic provinces and data applied in the range of the northern spotted owl. For the California Cascades Province, we used information regarding the rate of barred owl removal in an ongoing experimental removal program in this province.

Physiographic Province	Study Area Data Applied	Estimated Number of Barred Owls Detected per 1,000 Acres
Olympic Peninsula	Oregon Coast Ranges	2.89
Western Washington Cascades	Oregon Coast Ranges	2.89
Eastern Washington Cascades	Cle Elum	1.35
Washington Lowlands	Oregon Coast Ranges	2.89
Oregon Coast Ranges	Oregon Coast Ranges	2.89
Western Oregon Cascades	Oregon Coast Ranges	2.89
Eastern Oregon Cascades	Cle Elum	1.35
Oregon Klamath	Union/Myrtle-Klamath	2.55
California Coast	Willow Creek	1.19
California Klamath	Willow Creek	1.19
California Cascades	none	estimated from removal studies

There are no existing estimates of total barred owl population size across the range of the northern and California spotted owls. Until recently, we did not have the capability to realistically provide such an estimate, even in a general sense. While data are still limited, we have attempted to determine the potential current barred owl population size by province.

Barred owls use a wide variety of forest types, and there is no barred owl habitat GIS layer available at this time. In the past we used spotted owl habitat as the surrogate for barred owls, but this likely substantially underestimated the available barred owl habitat. For this EIS, within the range of the northern spotted owl, we are utilizing a GIS layer that identifies areas capable of supporting forest landscapes (forest lands) as the surrogate habitat base on which to extrapolate potential barred owl populations. Using the densities from Table A3-1, and the acres of forest land in each province, we estimated the potential barred owl population in each province (Table 3-1). These estimates are based on the maximum number of barred owls detected per survey site (500-ha hexagon plot) per year, averaged across survey sites for each area and do not account for imperfect detection rates of barred owls during survey. Therefore, even though the resulting numbers appear precise, these should be considered general estimates.

For the California Cascades Province, where barred owls are not yet well established, we use an estimate derived from ongoing barred owl removal experiments. This province is also one of the leading potential pathways of barred owl invasion into the California spotted owl range. Thus, the focus for barred owl management is on the location and removal of all barred owls in this province. The estimate of removal is based on six years of data from experimental removal in the area. The average number of barred owls removed in the California Cascades Province was 11.3 per year. Removal occurred on approximately 21 percent of the province. Therefore, we anticipate removal of 42 barred owls per year under the preferred alternative.

Table A3-3. Estimate of potential barred owl populations by physiographic province.

Physiographic Province	Study Area Data Applied	Estimated Number of Barred Owls Detected per 1,000 Acres	Acres of Forest Lands	Estimated Initial Population of Barred Owls
Olympic Peninsula	Oregon Coast Ranges	2.89	2,721,994	7,867
Western Washington Cascades	Oregon Coast Ranges	2.89	5,259,617	15,200
Eastern Washington Cascades	Cle Elum	1.35	4,213,859	5,689
Western Washington Lowlands	Oregon Coast Ranges	2.89	4,529,737	13,091
Oregon Coast Ranges	Oregon Coast Ranges	2.89	5,492,609	15,874
Western Oregon Cascades	Oregon Coast Ranges	2.89	6,547,882	18,952
Eastern Oregon Cascades	Cle Elum	1.35	2,097,231	2,818

Physiographic Province	Study Area Data Applied	Estimated Number of Barred Owls Detected per 1,000 Acres	Acres of Forest Lands	Estimated Initial Population of Barred Owls
Oregon Klamath	Union/Myrtle-Klamath	2.55	3,619,558	9,230
California Coast	Willow Creek	1.19	3,915,313	4,659
California Klamath	Willow Creek	1.19	5,531,309	6,582
California Cascades	Willow Creek	Local estimate	1,976,883	200
TOTAL			45,905,993	100,162

A3.1.1 Factors Influencing the Number of Barred Owls Removed under Each Action Alternative

Starting with the estimated initial population of territorial barred owls in each management area, we then estimated the number of barred owls that would likely be removed on areas under barred owl management for each alternative, considering three factors:

- Rate at which territorial barred owls would be removed from each area.
- Source for, and rate of, barred owl reoccupancy of sites after the initial territorial barred owls had been removed, thereby recruiting to the territorial population.
- Rate at which barred owls recolonizing the management areas would themselves be removed.

A3.1.2 Annual Rate of Removal of Territorial Barred Owls

Initial results of work done on lands of the Green Diamond Resource Company, under a separate scientific collecting permit, provide evidence that removal of territorial barred owls in management areas with good access, and employing experienced, trained shooters, can achieve rates exceeding 90 percent per year. Results from the Barred Owl Removal Experiment showed that the per visit removal success rate, defined as the mean number of barred owls removed per visit divided by the mean number of barred owls detected, ranged from 57 percent in Oregon to 78 percent in Washington (D. Wiens pers comm), with the cumulative removal success rate across three visits greater than 92 percent.

Removal rates can approach 100 percent if repeated removal visits to each sample site are conducted, or in areas with excellent access if intensive surveys are done prior to initiating removal; however, removal rates are likely lower in areas with restricted access (e.g., wilderness areas or parks) or extended periods of snow cover, or during winter months when barred owls are likely to be less responsive.

Although our goal for territorial barred owl removal would be 100 percent in most cases, we anticipate an overall rate closer to 90 percent and use this for assessing the effects of removal of barred owls. We will continue to collect additional information to improve on our understanding of removal success.

A3.1.3 Source of Barred Owls That May Recruit into Sites within Barred Owl Management Areas

Similar to spotted owls, territorial barred owls tend to remain within their home ranges as long as they can defend a territory, and maintain a pair bond, or attract a mate. We anticipate that very few territorial barred owls will leave their territories and move into the barred owl management areas from adjacent suitable habitat unless they are displaced or are unsuccessful in establishing a pair bond in that territory. For sites along the border of barred owl management areas, territorial barred owls may adjust their territories to include areas within the removal footprint. We anticipate that adults moving into the barred owl management areas would be removed at the same rate as any other territorial barred owl.

We evaluated two primary sources of barred owls that may repopulate sites once the territorial barred owls are removed, thereby recruiting to the territorial population: "floaters" and dispersers. Floaters are non-territorial, transient, barred owls that persist in an area. Dispersers may come from outside the barred owl management area or residual reproduction from within the removal area.

Floater Barred Owls

"Floater" barred owls are defined as adults or subadults that have not been able to achieve pair or territorial status. Floaters do not have established territories but may persist within the landscape as potential replacements for territorial individuals. Floaters may not disperse great distances, yet typically are not restricted in their annual movements to a home range associated with a single territory. We anticipate that floaters will occur within suitable habitat in or near barred owl management areas, especially where barred owls are currently at or near carrying capacity within a landscape. Such individuals, as differentiated from dispersing barred owls, would tend to move shorter distances and remain within a more localized landscape. We are unaware of data or numeric information that would allow us to precisely quantify the extent of this barred owl population, or that would allow us to estimate the distances such individuals may travel in search of a potentially vacant territory or available mate.

We anticipate that the number of barred owl floaters would be highest in populations where territorial barred owl pairs approached saturation densities (i.e., near carrying capacity), and low in populations where territorial densities were not fully saturated. Removal of territorial barred owls in management areas would create vacant territories or unpaired potential mates where floaters may attempt to establish a territory or pair up with unmated barred owls. Removal of territorial individuals would likely result in the floaters rapidly establishing territories, and themselves being subject to removal. We anticipate the number of floaters would decline during the early years of the experiment, with few barred owl floaters remaining in the management areas in later years. That does not mean that sites will remain unoccupied without additional removal as dispersing barred owls may fill these sites (see *dispersing barred owls)* We anticipate that most "floaters" would become territorial individuals after the removal of the initial territorial barred owls.

Between the start of the first and second years of removal, we anticipate that a relatively high proportion of the territorial barred owls that are removed would be replaced by adult and subadult floaters already present in the management area or immediately adjacent untreated area. The number of barred owls in the floater pool would depend on two factors: (a) the current density of territorial barred owls compared to the overall carrying capacity of the area; and (b) the number of years that the area may have been at or near carrying capacity, producing young who survived as non-territorial floaters on the landscape. In areas substantially below carrying capacity, floaters would have many opportunities to establish a territory, so few individuals would have to remain floaters (non-territorial and moving around the landscape). In these cases, the number of barred owl floaters on the landscape would be low. Conversely, we anticipate that landscapes already at carrying capacity would have a high number of available floaters that would reoccupy vacated territories soon after removal of territorial barred owls.

Dispersing Barred Owls

We define dispersing barred owls as individuals emigrating from their natal area. These individuals may travel over large areas, potentially up to 50 miles or more, in search of suitable habitat and available mates before attempting to become territorial. Based on our knowledge of spotted owl dispersal, we anticipate barred owl dispersal begins in early fall, and a large proportion of the total distance moved during the animal's lifetime occurs during the first 6 months to 1 year following fledging, though some may continue to disperse for 2 or more years. As many as 50 to 90 percent of dispersing juvenile spotted owls may die during their first year of life as a result of starvation, avian predation, and other natural causes. We anticipate similar rates for juvenile barred owls and suggest their rate of natural mortality during the initial dispersal period is likely quite high. We anticipate that some dispersing individuals from within the management areas and the surrounding, untreated landscapes would move into suitable habitat within the management areas from which barred owls have been removed.

After the first year of removal, we anticipate lower barred owl reproduction within the management areas themselves, as there would be fewer pairs remaining to nest. If we achieved our anticipated 90 percent removal of territorial barred owls within the management areas, very few barred owl sites would be occupied by a stable pair during management efforts; therefore, reproduction within the management areas would be low. We expect some pairs would be successfully re-established during the management efforts, but since removal may occur during the breeding season, we anticipate that few of these pairs would successfully nest. In addition, since most dispersers entering the management area would likely be young-of-the-year juveniles or immature subadults, their ability to form pair bonds prior to the breeding season may be substantially less than that of territorial adults.

We anticipate that a lower proportion of barred owl sites within the management areas would be occupied by territorial adult or subadult barred owl pairs while management efforts were underway. Intensive barred owl removal is intended to reduce the number of breeding barred owls in the management areas to very low levels. However, results from the barred owl removal experiment indicate that this may be overly optimistic in the short term in areas with

well-established barred owl populations where many sites are reoccupied by barred owls in the first few years. Still, a high rate of removal of territorial adult barred owls and the follow-up removal of barred owls reoccupying those sites annually should ensure fewer fledglings would be produced within the management areas.

In areas where barred owls are not fully established, such as the California Cascades Province and the Sonoma/Marin Management Area, most barred owls will likely be dispersing individuals. Given this, the rate of recolonization would likely be much lower than in areas with nearby established barred owl populations to provide disperser or floaters. Therefore, for these areas, we extrapolated the current rate of removal on the removal experiment that have been underway in these areas, extrapolating to the entire area as needed.

Recruitment or Immigration Rate

Whether the source be floaters or dispersing barred owls, we anticipate that some level of cleared sites within the management areas would become occupied by barred owls before the following removal period. The rate of recruitment of barred owls into the territorial population for this period is anticipated to be relatively high (60 percent) in most areas, though lower (35 percent) in the eastern Cascades of Washington and Oregon, based on data from the Barred Owl Removal Experiment (Wiens, D. 2023. pers. comm.). This did not vary substantially from year to year during the study, which ran for 4-5 years. We anticipate that this recruitment rate may eventually decline as surrounding barred owl population stabilize and fewer young or floaters are available to move into the nearby management areas, but we have no data on which to base such a declining function. Therefore, we have, for this analysis, used the values above throughout the analysis.

A3.1.4 Rate of Removal of New Territorial Individuals and Pairs

Following the removal of territorial pairs or individuals, and the consequent availability of suitable habitat and unpaired mates, we anticipate that barred owls would reoccupy some of these vacated sites and recruit barred owls into the territorial population. Based on the results of the barred owl removal experiment, we anticipate recruitment would reach 60 percent in most areas where barred owl populations are well established, and 35 percent in the drier forests of the Eastern Cascades provinces in Washington and Oregon. These levels did not vary substantially from year to year during the study. Individuals that did establish territories would themselves be subject to removal in subsequent efforts. Therefore, we anticipate they would be removed at the same rate as the original territory holders. Individuals on newly established territories may initially be less responsive to survey calls. Hence, the removal rate for newly territorial or younger individuals may be lower than for well-established territorial barred owls.

For the analysis we assumed a constant rate of recruitment into the area, and a constant rate of removal of these individuals. We acknowledge that this approach simplifies the annual variation in removal that may occur in any management area. The actual rate of recruitment would likely vary from year to year, in response to highly variable annual breeding success, that itself would be subject to climatic and other stochastic influences. Our example attempts to estimate removal numbers based on averaged conditions over several years and we believe it represents a

reasonable scenario of removal conditions and numbers that allows for comparisons between alternatives.

A3.1.5 Estimate of the Annual Number of Barred Owls Removed under Each Action Alternative

We estimated the number of barred owls that would be removed under each alternative and the impacts to the barred owl from removal at this level in Section 3.3 of this FEIS. To develop these estimates, and evaluate their effects, we evaluated the initial barred owl population estimates for potential levels of management and the number of barred owls removed under each alternative. Below we describe how we estimated the number of barred owls removed under each alternative and option.

First Year of Removal

At the start of removal, the initial barred owl population would include many territorial individuals who typically respond well when surveyed, allowing us to locate a high proportion of the occupied barred owl sites. We assume that nearly all territorial individuals would be members of territorial pairs. We anticipate we would be able to remove approximately 90 percent of those individuals during the first year of removal on barred owl management areas.

In addition to the territorial individuals, we anticipate that the barred owl population in the management area would include floaters or dispersing juvenile and subadult barred owls that were not yet territorial, as described above. We anticipate that some of these floaters would quickly attempt to establish territories where barred owls were removed. We anticipate a recruitment rate of 60 percent of the initial number of territorial barred owls annually in most provinces, with 35 percent recruitment in the Eastern Cascades of Washington and Oregon.

Second and Subsequent Years of Removal

At the start of the second removal year and each year thereafter, we assume approximately 10 percent of the territorial barred owls individuals from the previous year would remain (holdover population) on each barred owl management area. We anticipate the removal of approximately 90 percent of these territorial barred owls during the removal effort. In each year, we anticipate barred owls would recruit to the territorial population at a rate of 60 percent of the initial number of territorial barred owls annually in most provinces, with 35 percent recruitment in the Eastern Cascades of Washington and Oregon.

A3.2 California Spotted Owl Range

Barred owl populations are not yet well established in the range of the California spotted owl. A small barred owl population that was initially established in the northern Sierra Nevada was effectively removed during experimental removal between 2018 and 2020 (Hofstadter et al. 2022, entire). Seventy-six barred and barred/spotted hybrid owls were removed, resulting in barred owl site occupancy declining from 0.19 to 0.03. Monitoring in the area indicates that the barred owl population have not yet become re-established in the area at this time.

Most barred owls that become territorial, and therefore potentially subject to removal, in the California spotted owl range are likely the result of dispersal and invasion from the range of the northern spotted owl where reproductive barred owl populations exist, rather than local reproduction. Individual dispersing barred owls may travel very long distances, as shown by the first records for barred owls in western Washington (1972), Oregon (1974) and California (1976). At the time of the records, the closest breeding population of barred owls was likely in British Columbia or northeastern Washington.

While barred owl populations in the northern spotted owl range will continue to be a source of barred owls invading the California spotted owl range, the rate of re-occupancy or territorial establishment is likely to remain low and relatively easily controlled by removal of barred owls, if monitoring and removal continue across the potential colonization area.

As described above, after removal of the initial established barred owl population in the northern Sierra Nevada in 2018-19, removals continued under scientific taking permit at the rate of 10 to 15 barred owls per year. Because this is based on detected and reported barred owls, and not all areas are well surveyed, this may represent low estimate of the annual territorial barred owl population. Therefore, under full removal alternatives, we will consider the potential annual removal rate at the start of barred owl management as 30 barred owls for the Sierra Nevada. We anticipate these removal levels would continue at this rate for the next 10 years if extensive monitoring and removal continued. This is generally consistent with the reported number of new individual barred and barred/spotted owl hybrids reported between 2007 and 2017 (Keane et al. 2018), again based on incomplete surveys.

As barred owl populations in the range of the northern spotted owl continue to increase, we expect dispersal/invasion rates into the California spotted owl range will increase. Barred owl densities on the Willow Creek study area (California Klamath) are 1.19 barred owls per 1000 acres. On the Oregon Coast Range study area, where barred owl populations are approaching full occupancy, the density is 2.89 barred owls per 1000 acres. In the absence of a model or methodology to estimate barred owl carrying capacity in the California Klamath, we used the difference in these values to estimate the potential invasion rate for the California spotted owl range and used this as a surrogate for the increase in invading barred owls over time. Therefore, we anticipate the level of removal would increase by a factor of 1.2 in the second decade and 2.4 in the third decade.

For the southern California portion of the range, we note that to date no barred owls have been detected, though this may be due in part to limited survey efforts. Still, we anticipate that birders and other interested parties would be reporting some sightings if there were more than a very few individuals in the area. Given the early stage of invasion and the smaller area of barred owl management related the southern California range, we anticipate a maximum annual removal in the first decade of 5 barred owls per year, increasing at the same level described for the Sierra Nevada.

The calculation of the number of barred owls removed in management areas under each alternative derives from the proportion of the range that would be involved in removal. Based on

the past invasion history, we anticipate that barred owls will be more common in the areas nearer the source population, and therefore, where an alternative includes barred owl management would be applied on only a portion of the Sierra Nevada, we assume 75 percent of the barred owl population, and removal would occur in the northern third of the province. Where alternatives include additional area beyond the range of the California spotted owl, to address the invasion before it reaches the range, we will adjust these values by the area increase.

Example: If we assume initial removal in the Sierra Nevada 30 barred owls per year average over the first decade, the estimate for the second decade would be 66 per year, and the third decade would be 102 per year. Over the three decades, this would result in a maximum removal of 1,980. For the southern California population this would be 5 per year in the first decade, 11 per year in the second decade, and 17 per year in the third decade for a total of 330. For the entire range of the California spotted owl, over the three decades of the analysis, this would yield an estimate of 2,310 barred owls removed.

A3.3 Barred Owl Population

There are few population estimates for barred owls across their entire range and no wide-ranging systematic monitoring, such as breeding bird surveys. Range-wide barred owl population estimates are limited and rely on data not specifically designed to detect owls. However, these remain the best available information. The Partners in Flight Population Estimate Database[1] estimates the global barred owl population at 3.5 million (95 % confidence limits of 3.0 to 3.9 million). As this is the only barred owl population estimate available, we have used this to put the effects of each alternative in context. In addition, to provide another approach to describe range-wide effects to barred owls, we estimated the proportion of the entire North American barred owl population (based on range maps) affected by each alternative. For example, the range of the northern spotted owl is estimated to represent approximately 3 percent of the total range of the barred owl, so if 50 percent of the northern spotted owl range is potentially under barred owl management, the effect to the barred owl range wide would be 1.5 percent.

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Appendix 4. Monitoring Plan for the Barred Owl Management

A4.0 Changes between Draft and Final EIS

- No substantial changes.

All action alternatives require monitoring of both barred and spotted owl responses to barred owl management, as a requirement for the issuance of the Migratory Bird Treaty Act (MBTA) Special Purpose permit. The following describes the monitoring plans applicable to any selected action alternative, including **Implementation** and **Effectiveness Monitoring Plans**. Implementation monitoring would be focused on documenting that barred owl management actions conducted under the Service's MBTA permit are consistent with the selected Strategy and permit. Effectiveness monitoring would be focused on assessing the success of the management effort and providing information on the effectiveness of management under different conditions. For both types of monitoring, the Service, as the permit-holder, would be responsible for assembling the data contributed by designated implementers and conducting or securing Strategy-wide assessments and evaluations. In outlining this Monitoring Plan, we emphasize the information needed to document the implementation and effectiveness of the management efforts, rather than the particular methods used to gather the information.

A4.1. Implementation Monitoring for the Barred Owl Management Strategy

The overall purpose of the Implementation Monitoring Plan would be to ensure that the management actions occurring under the Service's MBTA permit, if issued, are consistent with the requirements of the barred owl removal protocol (Appendix 2) and the management plan outlined in the selected Strategy. Reporting the dates, locations, and numbers of barred owls taken, and their subsequent disposition would be a requirement for authorization under the Migratory Bird Treaty Act (MBTA).

The implementation monitoring plan was developed by reviewing the requirements in the removal protocol and information required to document those requirements, as well as the required for the annual reporting forms associated with Special Purpose MBTA permits.

A4.1.1 Annual report information required during implementation of barred owl removal.

Each group or individual designated to operate under the Service's MBTA permit shall submit annual reports including the information described below in Section A4.1.1.1 and A4.1.1.2.

A4.1.1.1 For each attempt to remove a barred or hybrid owl, summarize the following information:

- Date and time.
- Location, preferably in Universal Transverse Mercator coordinates, and also listing State and county.
- Species targeted (barred owl or identified hybrid)
- Name of removal specialist and any other persons assisting or observing

- For each carcass collected, provide the following information, recorded prior to burying or transmitting the carcass:
    - Body mass
    - Foot-pad length
    - Sex (if known)
    - A photograph of each of the following:
        - front of the bird, including head, chest, and tail, with a good view of the lower abdomen,
        - underside of the tail, flared out, and
        - underside of the spread wings.
    - Disposition of the carcass (not found, located but could not be safely accessed, buried on site, or retained and transmitted to an interested entity with the appropriate permits). Note that all owls identified as hybrids (whether the identification occurred before removal, after the carcass was in hand, or both) should be retained until released by USFWS. For carcasses retained and transmitted to other permitted entities, identify the entity to whom the carcass was transmitted.
    - For each carcass that could not be found, an incident report describing the situation, including any information regarding the likelihood that the shot may have missed, or that the bird was injured and escaped.

A4.1.1.2 For any injury or mortality of non-target species

If any non-target species is injured or killed during an attempt to remove a barred owl, the protocol requires that this be reported immediately to the designated Service contact, that any injured animal other than a barred owl be transported to a licensed rehabilitation facility, and that a written incident report be submitted to the Service within 3 days. A copy of this report should also be appended to the annual report and should include:

- Species identity of the animal injured or killed.
- Nature of the injury (including death).
- Circumstances surrounding the unintended injury or death, including pictures if available.
- If the animal was injured but not killed, the name and contact information of the rehabilitation facility to which it was transported.

If non-target threatened or endangered species is injured or killed during an attempt to remove a barred owl, the protocol requires that this be reported immediately to the designated Service contact, that any injured animal be transported to a veterinarian or licensed rehabilitation facility,

no further removal activities may be conducted until the Service reviews the incident report and authorizes such activities to resume.

A4.2 Effectiveness Monitoring for the Barred Owl Management Strategy

The overall purpose of the Effectiveness Monitoring Plan is to assess status and trends in populations of spotted owls and barred owls in barred owl management areas. Monitoring data would be used to assess the success of the barred owl management effort and provide information on the effectiveness of barred owl management under different conditions across the range of the northern and California spotted owl.

A key component of the monitoring plan is integration with monitoring of northern spotted owl populations and old forests on Federal lands under the Northwest Forest Plan Effectiveness Monitoring Plan, where feasible (Davis et al. 2022, entire; Lint et al. 1999, entire; Lesmeister et al. 2021, entire; Lesmeister et al. 2022, entire; Lesmeister and Jenkins 2022, entire). Use of this passive acoustic monitoring (PAM) network as a platform for evaluating barred owl management effectiveness would be anticipated to reduce cost and effort associated with monitoring requirements on Federal lands. However, integration with Northwest Forest Plan Effectiveness Monitoring would not be feasible in all areas where barred owls may be managed. Additionally, some potentially willing landowners or land managers may not wish to integrate monitoring on their lands with Northwest Forest Plan Effectiveness Monitoring. In these cases, we would accept monitoring data obtained by other means or by similar means not integrated with the Northwest Forest Plan Effectiveness Monitoring, as long as it provided the necessary information. In this way, we would avoid creating barriers for potential participants who would be able and willing to provide the necessary monitoring information, but not able or willing to integrate with Northwest Forest Plan Effectiveness Monitoring.

The development of the effectiveness monitoring plan was based on the following five steps (adapted from Lint et al. 1999, p. 1):

1. Specify monitoring goals, questions, and objectives.
2. Identify and evaluate population indicators that best represent changes to the status and trend of spotted owls (and barred owls) in managed areas.
    - Informed by long-term demographic studies (Franklin et al. 2021, entire), barred owl removal experiments (Diller et al. 2014, entire; Diller et al. 2016, entire; Hofstader et al. 2022, entire; Wiens et al. 2021, entire), and existing monitoring of spotted owls (Kelly et al. 2023, entire; Lesmeister and Jenkins 2022, entire).
3. Based on steps 1 and 2, recommend a monitoring approach to measure population status and trend of both species in areas identified for barred owl management (e.g., Focal Management Areas).
4. Recommend a framework to manage monitoring data and periodically analyze results.
5. Ensure feedback between monitoring data, data analyses, and future barred owl management decision-making.

A4.2.1 Monitoring Goal, Questions, and Objectives

The goal of the monitoring plan is to provide data that can be used to: 1) evaluate management actions in areas selected for management of barred owls; and 2) periodically evaluate the success of barred owl management in meeting the purpose and need to:

1. stop or slow northern spotted owl population declines caused by barred owls in selected treatment areas in the short term;
2. increase northern spotted owl populations over the longer term;
3. provide spotted owl habitat that is free of, or with reduced competition from, invasive barred owls;
4. limit the invasion of barred owls into the range of the California spotted owl by preventing the establishment of barred owl breeding populations;

Monitoring questions:
The monitoring plan is primarily designed to address *population-level* questions specific to the status of spotted owls and barred owls **in block-style management areas**. Key questions for each species include:

Spotted owls:

- Has barred owl management met the goal of slowing or stopping population declines (or increasing the annual population growth rate) of northern spotted owls relative to population status in the same area prior to barred owl management, or in comparable areas without management?
- What is the status and trend in abundance, site occupancy/site use, or local (site or territory) colonization/extinction rates of spotted owls in barred owl management areas relative to conditions prior to management or in comparable areas without management?

Barred owls

- Has barred owl management reduced the abundance of, or site use by, barred owls, thereby providing habitat for northern spotted owls with reduced competition from barred owls?
- Has barred owl management limited the colonization and establishment of barred owls into the range of California spotted owls?
- What is the status and trend in abundance, site occupancy/site use, or colonization rates of barred owls in managed areas?

Monitoring objectives:
The following objectives were specified to achieve the above monitoring goals and address key questions associated with management decision-making.

- Assess annual occurrence of spotted owls and barred owls at sites or areas selected for barred owl management.
- Assess changes in the population status or trend of spotted owls in managed areas.
    - e.g., annual change in the proportion of survey sites with one or more detections of spotted owls (Lesmeister and Jenkins 2022, entire).

    - for spotted owls, occupancy surveys completed prior to barred owl management implementation can expedite estimation of management effectiveness and population status and trend. In some cases, these monitoring data may already exist.
- Assess changes in barred owl populations to quantify effectiveness of management in limiting their re-establishment (northern spotted owl) or establishment (California spotted owl) in managed areas.
    - for barred owls, occupancy surveys completed prior to implementation can expedite estimation of effectiveness of barred owl management. In some cases, these monitoring data may already exist.

A4.3 Potential Population Indicators

Desired indicators of barred owl management effectiveness reflect ecologically quantifiable progress towards achievement of monitoring objectives. Desired population-level indicators should (modified from Lint et al. 1999, p. 5):

- Be based on methods with high detectability of focal owl species.
- Reflect the state of managed owl populations.
- Be quantifiable, cost-effective, and easily repeated over time.
- Show sufficient power in detecting changes in managed barred owl populations.
- Be readily distinguishable from background variation not related to barred owl management, such as habitat loss.

We narrowed the range of possible population indicators for each owl species based on the following considerations:

- Current availability of monitoring data on spotted owls and barred owls (e.g., detection/non-detection data used to estimate probability of site use from PAM; Appel et al. 2023, entire; Duchac et al. 2020, entire,).
- Indicators for spotted owls must be measurable population characteristics of spotted owls known to be sensitive to competition from barred owls: adult survival (Franklin et al. 2021 entire; Wiens et al. 2021 entire), site occupancy, colonization, and local extinction (Franklin et al. 2021, p. 13), breeding dispersal and pair status (Jenkins et al. 2019, entire; Jenkins et al. 2021, entire; Wiens et al. 2021, pp. 2, 7-8).
- For barred owls, removal data collected during management activities may be used to directly measure population changes over time without additional surveys (e.g., see methods described by Link et al. [2018, pp. 1548-1549] and Udell et al. [2022, entire]). Quantitative methods for this approach for barred owls are currently under development (D. Wiens, pers. comm.)

Population indicators applicable to spotted owls and barred owls

We recommend using non-invasive (passive) survey methods to monitor and track changes in population status of spotted owls and barred owls simultaneously in areas selected for management. These methods provide the information needed to monitor implementation of

barred owl management while avoiding injury to spotted owls. In using passive monitoring, we recommend focusing on the following population vital rates:

Territory occupancy (detection/non-detection data)

- For northern spotted owls, territories are approximated by provincial core use areas and home ranges, or defined by polygons depicting historical use areas (e.g., demographic monitoring by Franklin et al. 2021, p. 3).
- For California spotted owls, territories are approximated by Protected Activity Centers.
- Historically, territory occupancy has been determined through call-broadcast surveys or mark-resight studies. Focused use of PAM within known high-use portions of a territory can also provide data regarding territory occupancy.

Site use (detection/non-detection data)

- Where survey sites are randomly placed (e.g., in hexagon survey plots used for existing PAM programs), site use is distinct from territory occupancy in that it provides information on spotted owl presence and absence, but not necessarily on-site fidelity or pair status
    - For northern spotted owls, sites have been defined as 5-km^2 survey hexagons (e.g., PAM by Lesmeister and Jenkins 2022, entire)
    - For California spotted owls, sites have been defined as 4-km^2 survey hexagons.

Population size/abundance (numbers of territorial individuals)

- This is not typically estimated in spotted owl demographic studies or monitoring programs, but see Davis et al. (2022, pp. 18-19) for example of habitat-based estimates of number of occupied territories. Note that habitat-based estimates of occupancy also rely on existing information regarding occupancy rate (see above).
- This can be estimated using count-based models (e.g., *N*-mixture abundance estimation; Duarte et al. [2018, entire]; Royle [2004, entire]; see Wiens et al. [2017, pp. 13-14] for application with barred owls), or multistate occupancy models for estimation of relative abundance and population trends (Steen et al. 2023, entire).
- For barred owls, abundance can be estimated directly from lethal removal activities (e.g., number detected vs. number removed per visit to each sample site; see Rodriguez de Rivera and McCrea [2021, pp. 18–19]).

Population indicators specific to spotted owl demographic studies:

Previous demographic monitoring of spotted owl populations was based on call-broadcast survey methods to detect the presence of territorial owls, followed by capture-mark-resight methods to mark individuals and track their survival and reproduction over time (Franklin et al. 1996, entire; Franklin et al. 2021, entire). While these demographic monitoring methods have been largely discontinued and replaced with non-invasive surveys, some groups may opt to conduct demographic studies for a variety of reasons, and may wish to use this information to evaluate the effectiveness of barred owl management. In such cases, we recommend focusing on the following population vital rates:

Adult survival (i.e., apparent survival; Franklin et al. [2021, entire])

- Adult survival is typically estimated with mark-resight data (but see Rossman et al. 2019, entire).
- Estimates of adult survival are typically focused on breeding/territorial birds.
- Barred owls are known to disproportionately impact adult survival of spotted owls (Wiens et al. 2021, pp. 6-7).
- Adult survival has a disproportionate contribution to changes in population growth rate relative to other population vital rates (Diller et al. 2016; Dugger et al. 2016; Franklin et al. 2021; Noon and Biles 1990; Wiens et al. 2021).

Reproductive rate/number of young fledged (NYF)

- One measure is the proportion of sites monitored with ≤1 fledgling (e.g., reproductive rate defined by Rockweit et al. 2023).
    - This measure can be estimated without capture-mark-resight data based on the proportion of monitored sites where at least 1 fledging was detected.
- A more precise measure is fecundity (number of female fledglings produced per territorial female; Franklin et al. 2021).
    - This measure requires capture-mark-resight data from territorial birds.
    - Reproduction is known to be sensitive to fluctuations in local weather and regional climate (Glenn et al. 2011a, entire; Glenn et al. 2011b, entire), and less responsive to barred owl presence relative to other population characteristics like adult survival and territory occupancy (Diller et al. 2016, pp. 11-12, Wiens et al. 2021, pp. 4-5).

A4.4 Management Scales and Data Needs

Species-specific monitoring is important across multiple spatial scales of barred owl management actions. Below we describe each scale and identify corresponding minimum data requirements needed to determine effectiveness of management actions. Except where otherwise noted, groups and individuals designated to implement barred owl management under the Service's permit would ensure that the monitoring data described below, at the scale appropriate to each management area, are collected and provided to the Service.

Individual site (territory) scale

At this scale, barred owl management may occur at individual territories recently or historically used by spotted owls. The primary indicators of management effectiveness at this scale are territory occupancy or site use, based on detection/non-detection data collected within the provincial home-range radius of the site for both owl species. Counts of individual spotted owls or barred owls detected on each survey occasion are desirable if using survey methods that provide such information. For Passive acoustic monitoring (PAM) survey methods (see below), we recommend reporting the number of repeated sampling occasions with positive vocal detections to help differentiate territory occupancy from infrequent use of the site (see Watson et al. 2023, entire). Note that methods to estimate numbers of individuals or territorial pairs using PAM are under development (Kelly et al. 2023 entire; D. Lesmeister pers. comm.)

Small block scale (e.g., 30 pair size areas or larger)
At this scale, barred owl management occurs across areas capable of supporting multiple (at least 30) territorial pairs of spotted owls. Indicators of population status at this scale include site occupancy/use (i.e., proportion of historical territories or PAM sites surveyed with positive detections), reproductive rate, or population size/abundance. PAM sites may include hexagons (i.e., groups of 3-4 autonomous recording units [ARUs] within a hexagon), or ARU stations within hexagons. Note that some barred owl management areas may be larger than a single site but smaller than a 30-pair area, and these would be monitored using the same methods used for individual sites.

Large block (50-pair size areas) or provincial scale: Includes larger barred owl management areas (particularly those that overlap study areas used for Northwest Forest Plan monitoring) or entire provinces (i.e., a collection of sites and/or multiple Focal Management Areas). Indicators at this scale include site occupancy/use, reproductive rate, population size/abundance. This scale includes areas with and without barred owl management, providing monitoring data that can be compared with data from managed areas to increased understanding of management effectiveness. At the provincial scale, the Service would be responsible for assembling the data contributed by designated implementers.

Range-wide scale
Includes all provinces and populations, respectively, within the northern and California spotted owl geographic ranges. This facilitates testing of Strategy effectiveness using all managed areas combined within range-wide meta-analysis, similar to that completed by Wiens et al. 2021. Indicators include site use or occupancy; reproductive rate; population size/abundance. The Service would be responsible for assembling the data contributed by designated implementers and conducting or securing range-wide assessments and evaluations.

A4.5 Recommended Monitoring Approach

Established and standardized monitoring protocols are recommended initially for the focal owl species (spotted and barred owls), but the monitoring plan can accommodate future changes associated with the development of existing or new methods. Below we provide descriptions of recommended monitoring methods that each group or individual designated implementer can employ to satisfy permitting requirements while providing information on management effectiveness at one or more of the spatial scales identified above.

Passive Acoustic Monitoring (applicable across all management scales)
Over the past several years, population monitoring of northern spotted owls and California spotted owls on Federal lands has transitioned from traditional call-playback and mark-resight demographic studies to a broad-scale PAM sampling design **(**Fig. 1; Lesmeister et al. 2021 entire, Lesmeister and Jenkins 2022 entire). The monitoring design uses ARUs to measure owl use at recording stations (~250-m radius around ARUs) and sample sites in which three or four ARUs are placed (5-km^2 hexagons for northern spotted owls, 4-km^2 for California spotted owls). Sample hexagons are monitored over a six-week period during the breeding season, and colonization and extinction rates of those sites are estimated using occupancy modeling to track changes in populations of spotted owls and barred owls and estimate population trend. Now fully

implemented as of 2023, the PAM sampling network (used for effectiveness monitoring of northern spotted owls under the Northwest Forest Plan) includes 20 percent coverage of Federal forest lands (i.e., forested lands of all age classes, including recently burned, harvested, or otherwise disturbed areas) in seven historical spotted owl demography study areas, and 2 percent coverage of Federal forest lands across the entire northern spotted owl range within the United States (Lesmeister and Jenkins 2021, Figure 1, entire).

The PAM sampling design for northern spotted owls (Lesmeister et al. 2021) has been shown to be effective for detecting the presence of spotted owls and barred owls while accounting for uncertainties associated with the sampling design (e.g., effects of background noise levels on detectability; Duchac et al. 2020). More recently, data from the PAM network was used to estimate spotted owl sex (Dale et al. 2022, entire) and the probability of pair vocalizations at sample sites (Appel et al. 2023, entire). Further, these data can be integrated with traditional call-broadcast survey methods to estimate population trends for spotted owls (see Weldy et al. 2022 entire) or barred owls.

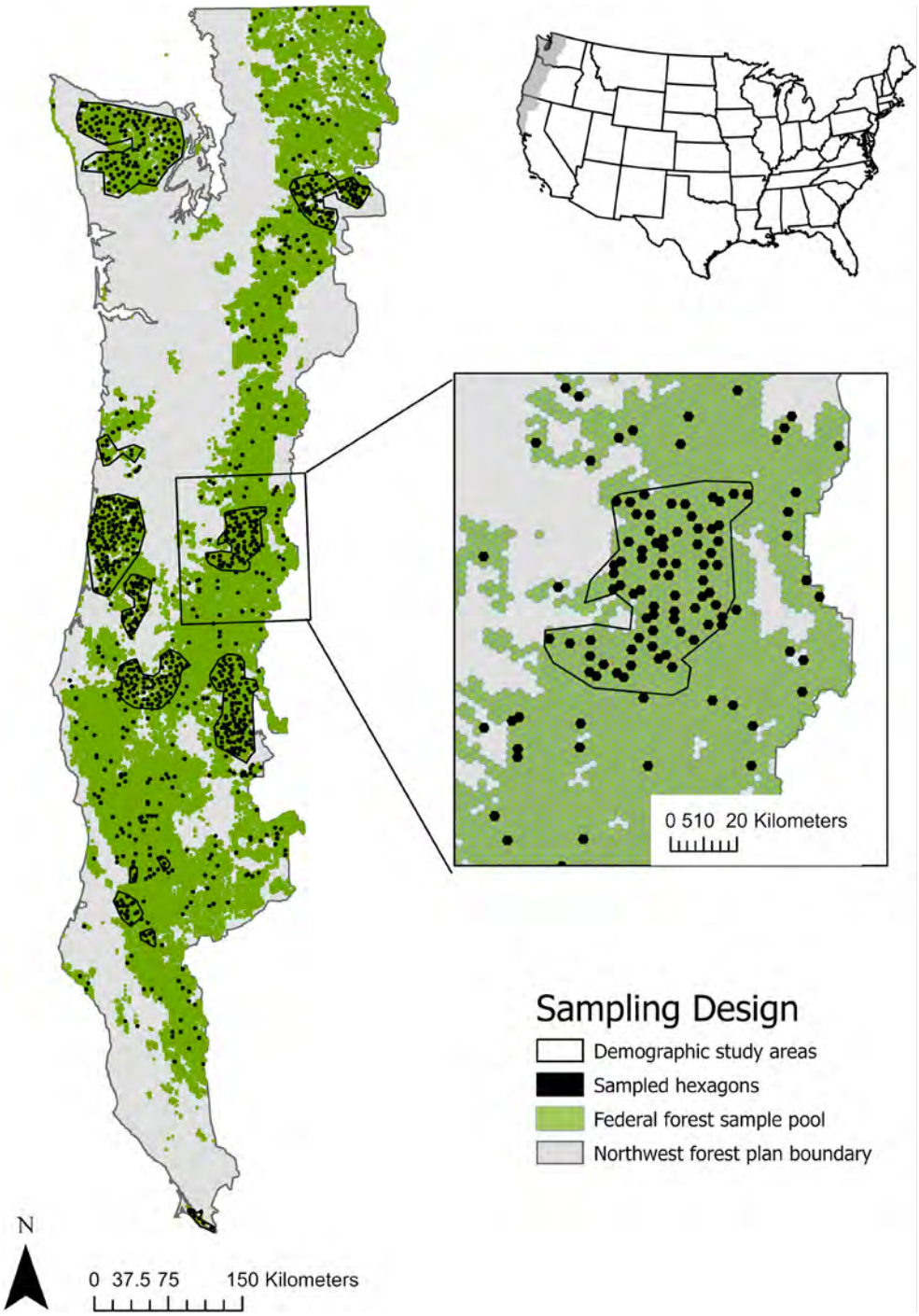

Figure 1 (*from Lesmeister and Jenkins, 2021, p. 5*). Map of the planned passive acoustic monitoring network for northern spotted owls, barred owls, and other species in the Northwest Forest Plan area. Green area is the pool of 5-km^2 hexagons that are at least 50 percent forest cover and at least 25 percent under Federal land management. Black outlines are historical study areas for northern spotted owl demographic and territory occupancy monitoring. Black 5-km^2 hexagons are randomly selected from pool of green hexagons. Within historical study areas, 20 percent of hexagons were randomly selected, and outside those study areas 2 percent of hexagons were randomly selected. The full network design will be implemented in 2023-24.

The PAM network would serve as a primary basis for effectiveness monitoring of both spotted owls and barred owls on Federal lands (Fig. 1). Monitoring data from barred owl management areas can be coupled with PAM data collected outside of these areas to gauge the status of managed relative to unmanaged populations of spotted and barred owls. Such comparisons may expedite assessments of management effectiveness.

Use of PAM in the range of the California Spotted Owl:
The existing PAM network in the Sierra Nevada can be used to monitor for barred owls. Specific recommendations concerning monitoring in the California spotted owl range are to:

1. Maintain and continue established monitoring network for the detection of barred and spotted owls. Monitor all sources of information on barred owl detections, including broad-scale systematic sampling and focal monitoring at sentinel spotted owl research sites.

2. Initiate inventory and monitoring network within potential barred owl dispersal pathways into the Sierra Nevada from the northern spotted owl range in the northern Sierra Nevada area.

Use of PAM on non-Federal lands:
The Northwest Forest Plan PAM network uses established protocols to survey and monitor northern spotted owl and barred owls on Federal lands only. These protocols rely on a hexagon grid that includes both Federal and non-federal lands in the range of the northern spotted owl (e.g., Fig. 1), though only Federal lands are monitored for the Northwest Forest Plan effectiveness monitoring. If non-federal implementers choose to do so, they can initiate PAM monitoring that can be integrated into the broader network using established sampling and monitoring protocols.

Call-playback surveys (applicable at site- and block-management scales)
This method is also used for locating barred owls for removal activities (see barred owl removal protocol). This permits estimation of site occupancy and use by spotted owls and barred owls, but requires species-specific surveys to maximize detectability (Wiens et al. 2011, pp. 4-5). It is recommended that call-playback surveys also use the PAM hexagon grid, so that monitoring data may be integrated with broader PAM sampling to increase the scope of inference using integrated occupancy modeling (e.g., Doser et al. 2022, entire).

Mark-resight surveys (applicable at site and block scales)
Currently this is the only method that can reliably estimate adult apparent survival of spotted owls, a key indicator of management effectiveness. However, apparent survival can be estimated without mark-recapture methods (e.g., Rossman et al. 2020, entire), though such methods fail to account for territory turnover. Mark-resight methods permit estimation of survival, recruitment, and finite rate of annual population change (e.g., Franklin et al. 2021; Wiens et al. 2021, p. 8). These methods have been discontinued in most areas, but remain an option for monitoring of barred owl management if the landowner or land manager choses to do so. In addition, the method is currently limited to spotted owls only.

Sampling considerations:
For site-level management, we recommend full coverage of managed provincial home range radius centered on last known activity center, using either PAM or call-broadcast survey methods.

For block-level management (30 pair-size area or larger), we recommend a minimum of 20 percent coverage of a managed block area using the randomized hexagon grid design outlined by Lesmeister et al. (2021, pp. 2-4, and see also Figure 1 in this document). In this case sampling sufficiency is based on expected landscape occupancy of spotted owls, with greater sampling effort required in areas with a lower occupancy rate in order to detect changes. Thus, in cases where spotted owl site occupancy (proportion of survey sites with detections) is known to be low (less than 20 percent), greater levels of coverage would be required to adequately detect changes in focal owl populations relative to areas where occupancy is expected to be higher (greater than 20 percent).

To determine how monitoring resources should be allocated within a given management area, three pieces of information are required: 1) the level of acceptable precision of the occupancy estimate; 2) the expected probability of occupancy and detection; and 3) the maximum number of surveys that could be conducted (MacKenzie et al. 2006, p. 165; Bailey et al. 2007, entire). Once this information is obtained, it is recommended to follow guidelines outlined for a standard occupancy study design in MacKenzie et al. (2006, pp. 167-173 and Table 6.1) or Bailey et al. 2007 (entire). In general, as the detection probability decreases, the optimal number of sites and surveys per site increases.

For the provincial and range-wide scales, the range-wide PAM network would be used for inferences on overall population status of northern spotted owls and barred owls. These areas may also be useful for comparisons of populations between managed and unmanaged areas. Sites designated for PAM were randomly selected from a grid of hexagons. For spotted owls, which are expected to be rare in many areas, a randomly selected survey site would have a low probability of occupancy, thus requiring larger numbers of sites, and site-visits, to obtain precise estimates of occupancy (i.e., coefficient of variation less than 20 percent).

A4.6 Data Analysis and Reporting

Periodic assessments of monitoring data for barred owls and spotted owls

- Annual assessments: The Service will evaluate the data collected under the Monitoring Plan on an annual basis to update estimates of selected population indicators for each owl species. Annual reports submitted by designated implementers to the Service will include basic results of annual monitoring efforts completed within established management areas (e.g., numbers of detections per sample site for each owl species; numbers of barred owls removed).

- Five-year assessments: The Service will ensure that formal analyses and reporting of monitoring data and results will occur at regular, five-year intervals coincident with meta-analyses of northern spotted owl population trends under the Northwest Forest Plan

Effectiveness Monitoring Plan. The forthcoming meta-analysis in 2024 is anticipated to provide baseline monitoring data on site-use of spotted owls and barred owls from the range-wide PAM network, first implemented in 2023 (Fig. 1). These data will provide information on site use by spotted owls and barred owls in areas with and without management of barred owls, allowing for formal analyses of the effectiveness in meeting management goals as barred owl management is implemented. We recommend that five-year assessments include the analyses specified below. In the northern spotted owl range, monitoring data collected outside of the Northwest Forest Plan PAM framework may still be incorporated into northern spotted owl population meta-analyses, if the designated subpermittee agrees, and if methods are available to incorporate the data.

Two-species occupancy modeling (applicable to spotted and barred owls):
A two-species occupancy model (MacKenzie et al. 2017, entire) is the primary recommended modeling framework for determining population status and trend of northern spotted owls and barred owls, and for assessing the strength of evidence of management effects (see examples in Yackulic et al. 2014, pp. 267-271; Dugger et al. 2016, pp. 62-69; Franklin et al. 2021, pp. 3-9). This approach also serves as the recommended primary modeling approach for decision analyses.

Site occupancy data collected under PAM or call-broadcast survey protocols are used (or integrated) under this approach to provide estimates of site-occupancy, colonization, and extinction rate of spotted owls and barred owls while accounting for imperfect detection and other uncertainties associated with the sampling design. The model has been used extensively to estimate the co-occurrence dynamics of spotted owls and barred owls (Diller et al. 2014, entire; Franklin et al. 2021, p. 3-9; Yackulic et al. 2014, pp. 267-271). Data for this approach are based on site-specific detection histories that use repeated survey detections (1) and nondetections (0) for both spotted owls and barred owls within and between years at survey sites (e.g., 5-km^2 sample hexagons or historical spotted owl territories). Parameters of initial site occupancy/use, colonization, extinction, and detection probabilities for both species may be evaluated as potential functions of management effort or intensity (see below). The model can include spatial covariates representing relevant site-specific changes in local habitat conditions (e.g., Yackulic et al. 2019, p. 7), thereby providing a unified framework for inferences on management effectiveness for spotted owls and barred owls while accounting for underlying variation in habitat conditions.

Barred owl removal model (applicable to barred owls only):
For barred owls in block management areas, we recommend the use of an open-population removal model that uses barred owl removal data (e.g., numbers detected vs. removed per visit per site) to track change over time in abundance and distribution of managed populations and the success of management goals for barred owls. This method requires no additional survey cost for barred owls beyond that already required for barred owl removal. This method may be used in combination with the two-species occupancy analysis outlined above to provide detailed information on the effectiveness of management in limiting barred owls within and among different management areas.

Removal models specific to barred owls are currently under development and expected to be available in 2024 (D. Wiens, pers. comm). For recent examples of removal models that may be applicable to removal data for barred owls see Udell et al. (2022), Davis et al. (2022), and Link et al. (2018).

Reproductive success/number of young fledged (spotted and barred owls):

- See examples in Dugger et al. (2016, p. 69); Franklin et al. (2021); and Rockweit et al. (2023)
- Used in combination with two-species occupancy modeling and barred owl removal modeling to supplement assessments of management effectiveness.

Estimation of annual rate of population growth (λ_t) for spotted owls and barred owls:
Estimation of annual population growth rate may be based on site occupancy data (Lesmeister et al. 2021, entire; Steen et al. 2023, entire) collected under established PAM or call-broadcast survey protocols. Mark-resight data for estimation of population growth is also desirable as this would provide estimates of apparent survival and recruitment. However, it is recognized that these methods have been discontinued for monitoring spotted owls in most areas.

A4.7 Additional Considerations Beyond the Scope of the Monitoring Plan

Data management plan:
Organization and management of raw monitoring data and associated metadata used to track effectiveness of barred owl management actions would be overseen by the Service. Landowners, land managers, and other entities designated to act under the Service permit would be required to submit an annual report detailing all management and monitoring activities, along with relevant raw data in a standardized database format that can be queried for relevant data summaries.

Use of unmanaged areas (controls) as a baseline reference:
The extent to which controls (unmanaged) areas are included as references in analyses of management effectiveness would be addressed on a case-by-case basis. For valid comparisons, managed and unmanaged areas should be as similar as possible in terms of landscape conditions and status of owl populations prior to management action.

Before-After-Control-Impact vs. Before-After-Impact analyses:
We recommend a full Before-After-Control-Impact design for strong inference and applicability to the adaptive management framework, but recognize that pre-existing data may not always be available for selected management areas.

Duration of management actions:
We assume a minimum of five years of implementation would be used to determine local effectiveness of barred owl management. The specific length of time required to detect changes in populations of spotted owls barred owls, however, would depend on the relative density of barred owls and spotted owls in managed areas, landscape conditions in surrounding landscapes, and other environmental factors. In general, population-level response time of spotted owls to

barred owl management is expected to decrease as the ratio of spotted owls to barred owls increases (see discussions by Hofstadter et al. 2022, pp. 282-283; Wiens et al. 2021).

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Appendix 5: Scoping Comment Summary

A5.0 Changes between Draft and Final EIS

- No substantial changes from draft

This appendix describes the public noticing and engagement efforts undertaken by the U.S. Fish and Wildlife Service (Service) during the scoping period and summarizes comments received during the scoping period. The full contents of all scoping comments are available on Regulations.gov under the docket R1-ES-2022-0074-0001.

A5.1 Public Notices

The Notice of Intent (NOI) was published in the Federal Register on July 22, 2022 (87 FR 43886). The NOI provides background information on the Barred Owl Management Strategy, the purpose and need for the proposed action and potential alternatives, as well as information on the National Environmental Policy Act (NEPA) process and how to participate in the scoping process.

Notifications were distributed to interested parties including local State and Federal congressional representatives, Tribes, and Federal and State offices and departments, as well local counties and conservation organizations in Washington, Oregon, and California. The Service distributed a public scoping news release to the media announcing the availability of the NOI, the opportunity to attend a virtual public meeting, and explained how provide comments on July 22, 2022.

A5.2 Virtual Public Scoping Meeting

A virtual public meeting was held virtually on July 28, 2022, from 6 to 8 p.m. Pacific time. The meeting was held using Zoom as the webinar platform and included a presentation by the Service and a question-and-answer session. The purpose of the meeting was to provide information to the public about the NEPA process and the proposed action, and to allow participants to ask clarifying questions.

The virtual public meeting was attended by 47 individual stakeholders, with a presentation followed by a question-and-answer period. All questions were answered live during the webinar by members of the presentation team. During the virtual public meeting, the Service did not solicit, collect, or record oral public comments. Participants were provided detailed explanations on how to submit written comments online via Regulations.gov or via mail to FWS headquarters.

A5.3 Summary of Public Scoping Comments Received

During the scoping period a total of 37 comments were received: 3 from Federal agencies, 1 from a State agency, 4 from counties, 14 from nongovernmental organizations and businesses, and 15 from members of the public. As noted above, the full contents of all scoping comments

are available on Regulations.gov under the docket R1-ES-2022-0074-0001. Additionally, Chapter 4 of this FEIS provides a summary of the alternatives, information, and analyses submitted by State, Tribal, and local governments and other public commenters during scoping. Below is a summary of all comments received, by topic.

A5.3.1 General Support or Opposition

Multiple commenters expressed support for the Barred Owl Management Strategy, stating that they believe the Barred Owl Management Strategy was necessary to prevent extinction or extirpation of the Northern Spotted Owl, and was needed for survival and recovery for Northern Spotted Owl across its range.

Other commenters expressed opposition to the Barred Owl Management Strategy, including the following specific concerns: (1) lethal removal of barred owls was unfair to barred owls and inhumane, (2) if barred owl removal was not successful in the delisting of northern spotted owl, some commenters expressed concerns that more northern spotted owl could mean more limitations on logging which could have economic effects on rural communities.

A5.3.2 Scope of EIS Analysis

Commenters made the following suggestions regarding including in the EIS a full analysis of the effects of the effects of the proposed action and alternatives on the following:

- Costs of implementing the proposed strategy
- Impacts to rural economies/communities, environmental justice, and public safety
- Impacted resources
- Impacts on barred owls and hybridization
- Potential impacts to northern spotted owl from misidentification
- Trophic cascade impacts to prey species (rodents, amphibians, invertebrates, also pygmy and screech owls)
- Impact to non-target species including other wildlife species such as raptor species, and non-target species, habitat connectivity and wildlife movement
- Effects on water quality, pesticides
- Effects on threatened and endangered species
- Ecosystem services
- Noise
- Coordination with land use plans

Commenters requested the following financial logistics of the proposed action and alternatives be addressed in the EIS:

- Address how long-term actions would be supported if considerable funding and support will be required for Federal and non-federal implementers.
- Consider scope and costs. Provide regulatory and financial support to willing Federal and non-federal land managers or all efforts should be managed by USFWS.

- Commenters requested the EIS address the long-term strategy for continuous funding for implementation on all land ownerships, including for staff and training.

A5.3.3 Approach to EIS Analysis

Commenters made the following comments, suggestions, and questions regarding the approach to the EIS analysis:

- Include Baseline Environmental Conditions, an Alternatives Analysis, a full Climate Change Analysis, Cumulative Impacts Analysis and Public Review of the NEPA Document.
- Include Consultation with Tribal Governments. Incorporate any input on the stewardship of lands included in the program from their original inhabitants, including Tribal members and indigenous communities.
- Include an analysis for a monitoring program designed to assess implementation of the Barred Owl Management Strategy.
- Expand the scope of the EIS to include an analysis of minimizing adverse impacts of barred owl on native ecosystems and food webs including barred owl prey such as rodents, small mammals, amphibians, invertebrates, pygmy and screech owl.
- Do not include trophic cascade impacts of barred owls on northern spotted owl in this EIS. Focus on reducing barred owl impacts to northern spotted owls within the scope of this EIS. Include in the scope of the EIS a summary of the unknowns associated with this effort in terms of scope, scale, timing, duration, cost, unintended and non-target impacts, and the potential ability of spotted owls to adapt and evolve over time to coexist with barred owls.
- Include analysis of different strategies across the range of California and northern spotted owls because a one-size-fits-all approach may not be the most successful strategy in different parts of the ranges.
- An adaptive approach should be recommended in the EIS, and the EIS must explore ways to adjust Service's practices based on the success—or lack of success—of the program.
- Will the EIS assess the feasibility of expecting Federal agencies to have the resources, funding, and commitment needed to sustain the barred owl removal program?
- Discussion of the ethical dilemma inherent in the lethal control of one species of wildlife to conserve native wildlife.

Commenters recommend that the Service fully analyze the difficulties and limits of implementing a barred owl management strategy. Such analysis should consider at least the following:

- How will each of the alternatives support habitat connectivity and wildlife movement?
- Which species are likely to experience benefits or harm as a result of the program?
- How will the program address the potential difficulty of differentiating a barred owl from a spotted owl or potential hybridization between the two species?
- How will the program be designed to be as efficient and effective as possible, i.e., by removing as few owls as necessary to support goals of spotted owl population maintenance? How will high-priority management areas be identified?
- What population baselines are being used to design the program? Are they accurate and/or are additional surveys needed?

- What monitoring processes will be needed to track program outcomes? Does the program allow for flexibility in case changes are needed?
- What are the definitions and/or parameters of 'success' for the management program and what hinges on achieving such success (e.g., issuance of incidental take permits)?
- Will there be any direct, indirect, or cumulative resource impacts (such as impacts to habitat, air, and water quality) associated with program implementation?
- What will program implementation training and certification requirements entail? Are there any safety precautions that should be taken during implementation?

A5.3.4 Purpose and Need

Commenters suggested that the Service expand the purpose and need of the project to include the following objectives.

Expand the Scope of the Barred Owl Management Strategy to include additional protections for northern spotted owl including:

- northern spotted owl habitat protections/northern spotted owl habitat conservation and restoration in addition to barred owl removal
- fewer incidental take permits
- reduced salvage logging
- increased rodenticide monitoring
- include habitat protections, avoid any further incidental take,
- mandate barred owl removal for future Section 10 permit decisions.

Commenters suggested that the Service expand the scope of the purpose and need (and proposed action) to focus on the following areas.

- improving forest health to reduce the threat of catastrophic wildfire to spotted owls
- directing human actions that impact northern spotted owls such as preventing clear cutting instead of addressing the threat of barred owl competition
- increasing northern spotted owl populations in a way that improves the economic health of rural communities or ensures no negative impacts to rural economies
- supporting barred owl removal projects while the permanent strategy is under development.

Commenters requested that any strategy not prohibit Federal timber harvest or place additional limitations on timber harvest, but rather focus on barred owl management to recover spotted owl.

Commenters requested that the Service incorporate barred owl removal into all facets of the Service's work, from permitting to funding to wildlife recovery, to ensure a coherent and consistent approach. Consistently support barred owl removal as a component of Federal projects including Section 10 permitting, such as mandating barred owl removal for Safe Harbor Agreements, Habitat Conservation Plans, and other permit systems and work to revise existing plans to incorporate barred owl removal. Regulate wildlife rehabilitation facilities, to ensure that injured barred owls are not released back into spotted owl territory.

A5.3.5 Alternatives

Commenters suggested that the following alternatives or elements of alternatives be analyzed in the EIS:

No Action Alternative

- Analyze a no action alternative that includes allowing barred owl to spread and outcompete the northern spotted owl.

Proposed Action

Commenters asked that the Service modify the proposed action to include:

- Only humane (non-lethal) management.
- Promote research into non-lethal strategies such as birth control that could be integrated into barred owl control efforts over time.
- a focus on maintaining California spotted owl habitat rather than barred owl management.
- Using both lethal and non-lethal approaches, especially in more populated areas
- Discussion of the ethical dilemma inherent in the lethal control of one species of wildlife to conserve native wildlife.
- Funding for implementation across multiple landowners, reducing the cost and improving effectiveness, consistency and longevity of implementation for all participants.

Commenters recommended that the proposed action:

- Maintain habitat for spotted owls, in places and climates where that habitat is likely to persist and reoccur under future conditions.
- Work with land management agencies and private or collaborative groups to support a mosaic of seral states that includes old and structurally complex forests, and allowing fire where possible, while potentially limiting fire entry in areas where old forest is severely limited and similar structures would not recover for many decades to centuries if fire were to occur.
- Review Northwest Forest Plan provisions and static habitat designations to reflect current conditions, with the goal of maintaining fire refugia and supporting a shifting mosaic of habitat types and ages to the extent feasible, at least on public land.
- Habitat management strategies should not expect dry areas to produce wet-forest conditions, expect total fire exclusion to be effective, or expect individual reserve areas to remain unchanged over time.
- Support broader ecosystems in all species-focused actions to the extent possible, while recognizing the USFWS is constrained by the single-species focus of the Endangered Species Act.
- Focus resources on maintaining diverse ecosystem states and patterns to support as many species and interspecies relationships as possible.
- Combine barred owl management with a commensurate reduction in habitat degradation and removal, especially on public lands where Federal land management agencies continue to remove older habitat.

- In combination with barred owl management, adequately and aggressively address the threat, loss and fragmentation of mature and old growth forests.
- Continue to utilize the 1994 Northwest Forest Plan to restore northwest forest ecosystems and recover the spotted owl.
- Expand upon the Northwest Forest Plan and protect all spotted owl nesting, roosting and foraging habitat in mature and old growth forests on Federal lands and increasing protections on State and private lands.
- Increase habitat protections in the habitat conservation plans (HCPs) that are currently under development.
- Protect more habitat in order to both compensate for habitat lost to barred owl occupation.
- Prioritize habitat retention and connectivity in combination with a barred owl management program.
- Minimize human impacts to owl habitat.
- Barred owl management must be combined with meaningful reductions in habitat degradation and removal, especially on public lands where Federal land management agencies continue to remove older habitat.
- Do not authorize timber harvest or development in suitable spotted owl habitat in exchange for barred owl removal. Include both habitat conservation and barred owl removal to conserve spotted owls.
- Reaffirm the conclusions of the 2011 Recovery Plan that habitat protection and restoration is a necessary recovery action for the species.
- Until an active barred owl management plan is in effect, the Service should ensure that habitat modification does not further harm spotted owls and their habitat.
Recommendations:
- Until barred owl management stabilizes local spotted owl populations, commenters requested that the Service and other Federal partners not allow any incidental take of northern spotted owl, California spotted owl, or removal of designated critical habitat for either species.
- Commenters requested that the Service not authorize the loss of any suitable habitat for either northern or California spotted owls until a permanent barred owl control program is operational and showing positive results across most control areas or sites.

Ensure the proposed action includes management for barred owl in the following areas:

- Non-Federal lands; include funding for management on non-federal land.
- Marin County, the California Coast Range, and the Sierra Nevada and adjacent foothills.
- Northern California.
- Include Elliott State Forest and adjacent areas.
- Include barred owl removal in Oregon State University's research on the new proposed Elliott Management Reserve Watersheds) or Conservation Reserve Watersheds.
- Include the Weyerhaeuser Millicoma Tree Farm Adjacent to the Elliott with a 1995 northern spotted owl HCP.
- Include Roseburg Forest Products lands, adjacent to Millicoma Tree Farm, and adjacent private lands where the landowner commented they supported barred owl removal on their property.
- Include Cle Elum, Rainier and other demographic study areas where long-term data can be used to evaluate success.

- Immediately initiate barred owl removal in large Washington landscapes across multiple jurisdictions, including the Olympic peninsula and other parts of Washington that have resilient spotted owl populations or pairs, or significant tracts of suitable habitat to support recovering populations.
- Request that the Service devote substantial management strategy programming and resources to the Olympic Peninsula of western Washington State across multiple land ownerships on the Olympic Peninsula Including the Olympic Experimental State Forest under the Washington State Trust Lands Habitat Conservation Plan, Forest Service and National Park land.
- Include Federal lands within the vicinity of ongoing removal studies in Del Norte, Humboldt, Trinity, and Mendocino Counties as well as non-federal lands.
- Include Sierra Pacific lands in California and include neighboring lands to provide a defensible area.
- Include areas surrounding and designated as critical habitat for northern spotted owl.
- Include large scale removal across all land ownerships.
- Include high priority management sites that would complement ongoing removal efforts on Green Diamond's California Timberlands and lands of the Hoopa Valley Tribe.
- Prioritize removal on Federal lands within the vicinity of ongoing removal studies in Del Norte, Humboldt, Trinity, and Mendocino Counties.
- Prioritize areas where Federal land management agencies, private landowners with HCPs, and academic researchers have initiated barred owl removal studies in the range of the California spotted owl.
- Barred owl management on Bureau of Land Management (BLM) managed land should be focused on those acres currently designated as Late Successional Reserve to meet the to meet the requirement of the BLM Resource Management Plan and permit appropriate management of the Harvest Land Base in the near-term.
- Prioritize early removal of barred owls in California spotted owl territory and at the southern end of the northern spotted owl range.

Include the following considerations when selecting areas for barred owl management:

- Prioritize barred owl removal where localized extinction of northern or California spotted owls from barred owl invasion may be most likely. No area of spotted owl territory should be lost to barred owl invasion.
- Emphasize removal efforts across large blocks of land and at the edges of the California spotted owl range, to attempt to prevent additional barred owl encroachment into occupied California spotted owl habitat.
- Establish agreements before identifying management areas. De-prioritize areas where wildfire is likely.
- Prioritize removal near breeding pairs of spotted owl and barred owls.
- Prioritize wilderness/best habitat for barred owl removal.
- Management should be long-term/in perpetuity.
- Focus on areas of known occupancy.
- Include wilderness and other roadless areas.
- Focus on areas with biotic and abiotic features that are important to northern spotted owl survival and fitness.

- Prioritize areas where “large, continuous blocks” capable of supporting “a minimum of 20 northern spotted owl territories” occur.
- Consider areas selected for long term barred owl management as effective northern spotted owl sanctuaries.
- Consider long-term ability of land managers to manage a sustainable population based on land allocation and configuration.
- Designated wilderness areas with contiguous late-successional habitat that lack stable northern spotted owl populations could be candidates for spotted owl reintroduction.
- Focus on areas with higher concentration of barred owls with more severely declining populations of spotted owls to immediately benefit northern spotted owl populations.
- Focus on areas with declining northern spotted owl populations/higher concentration of barred owls.
- Focus management in areas with long-term northern spotted owl population data.
- Focus Initial management sites in areas with preexisting long-term northern spotted owl population data to minimize resources and establish data monitoring to evaluate success of strategy implementation.
- Focus management on high-quality habitat including Late Successional Reserves and designated Critical Habitat and the edge of California spotted owl range.
- prioritize management at the edge of the California spotted owl range.
- Focus on large blocks of high-quality habitat and at the edges of the California spotted owl range, to attempt to prevent additional barred owl encroachment into occupied California spotted owl habitat.
- Include areas where long term commitments are secured prior to implementation.
- Avoid areas where catastrophic wildfire would likely occur in the foreseeable future by utilizing maps and data for wildfire risk.
- Include State and local partners to assist in barred owl removal efforts.
- Under the management strategy do not require additional monitoring/reporting requirements to not cause additional burden for landowners that already have monitoring/reporting requirements in place for spotted owls and/or barred owls under a Federal permit (i.e., 10 (a)1(B)).
- Maximize removal efforts by prioritizing large-scale removal of barred owls across large removal areas to maximize the conservation benefit and to establish efficiencies of scale.
- Maximizing removal efforts by including removal on public and private lands with coordination between public and private entities. Costs and time expenditures can be distributed among different entities.
- Include a monitoring plan as part of the Barred Owl Management Strategy that includes adaptive management.
- Include analysis of different strategies across the range of California and northern spotted owls because a one-size-fits-all approach may not be the most successful strategy in different parts of the ranges.
- An adaptive approach should be recommended in the EIS, and the EIS must explore ways to adjust FWS’s practices based on the success—or lack of success—of the program.
- Incorporate strong adaptive management and expert review components that ensure the efficacy of this strategy will be regularly reviewed and refined over time in order to

maximize efficacy, minimize harm and is ensure that the strategy is substantially improving the spotted owl's chances for survival.

- Track progress of barred owl removal program. Continuously track the success of the barred owl removal program to determine whether it is having a long-term positive impact on northern spotted owl populations. Use a demographic study approach rather than an occupancy study approach.
- Ensure review, evaluation, and procedures for modifying or terminating control strategies as warranted...
- Include triggers for determining success at meeting the purpose and adaptive management needs after 15 years.
- Track program impacts on rural economies and adaptively manage or terminate the program if rural economies experience negative impacts from implementation of the Strategy.
- Aligning monitoring/reporting requirements for Barred Owl Management Strategy with existing efforts under S10 permits and other Endangered Species Act (ESA) regulatory compliance.

Commenters asked that the following questions be addressed:

- How will the strategy identify high-priority areas?
- Will these be only on public lands?
- What would be the buy-in process for private landowners? How will the management areas effect adjacent lands and what effects will be considered detrimental to the neighboring properties?
- What options will the adjacent properties have with barred owl management?
- Did past barred owl removals result in any documented mortality of spotted owls through either misidentification of owls or through accidental take of spotted owls? If so, how does the new proposed action aim to avoid any mortality of non-target species?
- Over the years of the Removal Experiment, were any significant impacts to the environment documented by any of the agencies involved in the Experiment? Did the Experiment result in the disturbance of raptors during the breeding season such that northern goshawks or spotted owls or other at-risk raptor species abandoned their nests or left young on the nest unprotected and thus vulnerable to predators? If so, how will the new strategy aim to avoid those impacts?
- What potential adverse impacts have been identified as possible outcomes if barred owls are lethally removed, but no spotted owls replace them in the territory over time?
- Have any documented accidents occurred in past barred owl removals that resulted in significant effects for humans?
- Will the EIS assess the feasibility of expecting Federal agencies to have the resources, funding, and commitment needed to sustain the barred owl removal program? In a scenario where ideal resources have been allocated for this project, how many barred owls would be expected to be taken per year?
- The results of an EIS are not intended to be used indefinitely. At what point in the long-term management's lifespan will another EIS be conducted to readdress this projects direct and indirect ecosystem impacts?

Action Alternatives

Scoping comments included proposed modifications or additions to the proposed action for inclusion in action alternatives:

- an action alternative that does not kill either species and protects both species.
- A quick and aggressive implementation to prevent northern spotted owl extirpation.
- Take a more gradual approach for barred owl management to slow down and prolongs the rate of introgression to avoid genetic swamping for a limited term.
- Focus on lethal removal to effectively address the threat of barred owl competition.
- Use shooting for lethal removal instead of poison to avoid impacts to non-target species.
- Act immediately with lethal removal across all land ownerships, across the range of northern spotted owl.
- Include the eradication or reduction in number of barred owls across the ranges of California spotted owl and northern spotted owl range to prevent extirpation in portions of the ranges and to prevent a loss of genetic diversity and adaptability to a range of current and future conditions.
- Include long term, sustained removal actions required for barred owls to be prevented from expanding their range or kept at such low numbers that they are not a significant threat to the spotted owl.
- Explore utilizing private individuals with extensive training and incentive programs to remove barred owls on multiple land ownership types including private and county lands.
- Emphasize commitment to utilizing highly trained personnel to conduct barred owl removal actions. Described whether it will be practicable from an economic, logistical and technical perspective to maintain these standards in a large-scale approach.
- Describe how non-target impacts will be avoided.
- Develop a plan to study and humanely manage the barred owl without lethal removal after in depth studies and subsequent proposals by specialists in the subject field.
- Conduct further study, including gathering additional genetic/genomic data through full-genome sequencing prior to managing barred owl.
- Research if forest management has contributed to barred owl invasion. Determine if barred owl populations can grow in dense forests and forests where large fires have occurred. Research if spotted owl populations can grow in forests treated for fire resiliency.
- Focus on spotted owl habitat instead of managing barred owls, or in combination with barred owl management.
- Analyze an alternative that maintains the California spotted owl's role in ecosystems without managing barred owls.

A5.4 Summary of Submitted Information and Analyses

The following supplemental information (i.e., supplemental materials or references) was submitted during scoping for consideration by the lead and cooperating agencies in developing the EIS.

The book entitled *Wild Souls: What We Owe Animals in a Changing World* by writer Emma Marris that presents philosophical ideas related to the ethical challenges of managing interactions between introduced and native species in conservation science.

The CNN series titled *Patagonia* that presents how the Puma is managed in a non-lethal way.

The Northwest Forest Plan, a land management plan that provides standards and guidelines for forest management on Federal lands and has guided the management of Federal forest lands within the range of the northern spotted owl since 1994.

Spotted owl and barred owl location and survey data in the *BIOS database* (from spotted owl surveys by North Coast Resource Management, Inc. and others) managed by California Department of Fish and Wildlife.

Research paper entitled *Advancing effects analysis for integrated, large-scale wildfire risk assessment* (2010) prepared by Thompson et al. presents maps and data for wildfire risk that can be used as a tool for assessing risk for land management decisions.

Thesis entitled *Age-Specific and Lifetime Reproductive Success of Known Age Northern Spotted Owls on Four Study Areas In Oregon and Washington*. (2008) by Peter Loschl presents research demonstrating that a small percentage of female spotted owls are responsible for the majority of reproductive output.

A research article entitled *Genomic Variation and Recent Populations Histories of Spotted (Strix occidentalis) and Barred Owls (Strix varia)* (2021) by Fujito et al. presents an estimated divergence time of the two species using genomic data and notes that results could have resulted from limited sample size and barred owl populations in central and eastern North American not being included in the sample.

Oregon Department of Forestry (ODF) Forest Activity Electronic Reporting and Notification System (FERNS) data which includes reports of rodenticide applications on private industrial forest land withing 300 feet of northern spotted owl nests.

The *Elliott State Research Forest Draft Habitat Conservation Plan*, July 2022. Page 2-32 which includes spotted owl survey results and decreasing spotted owl populations as barred owl populations increased.

The Habitat Conservation Plan for the Weyerhaeuser Millicoma Tree Farm (1995).

Videos of two spotted owls and several videos of multiple barred owls on private land west of Roseburg were provided by the private landowner:

- Spotted owl:
  https://youtu.be/2F-3b64RXbo.
  https://youtu.be/f-Oi_sYzGU8.

- Barred owls:
  https://youtu.be/W2LFw4s2rmA,
  https://youtu.be/_2uZrwEOFc8,
  https://youtu.be/EWQeYMcJPRc, juvenile barred owl,
  https://youtu.be/CniEn9WlQlY, barred owl eating a frog,
  https://youtu.be/ppKCZwbGmXE
  https://youtu.be/J-uczEoGhwM, barred owl eating a giant salamander.
  https://youtu.be/Fb6vHx6HKdg. two barred owls together.
  https://youtu.be/eRtlGNLEM7E, barred owl eating Townsend's mole.

Research paper entitled *Megafires: an emerging threat to old-forest species* (2016) prepared by Jones et al. presents evidence of different responses of spotted owls to low and high severity fires.

The Federal regulation entitled 40 CFR 1502.14, which directs agencies to quantify the potential direct, indirect, and cumulative environmental impacts of each alternative in an EIS.

The Federal regulation entitled 40 CFR 1508.1(g)(1)), which directs agencies to include resources directly impacted by the project footprint within the geographic scope of analysis, as well as the resources indirectly (or secondarily) impacted by the project.

The resource *Wildlife Carcass Disposal. Wildlife Damage Management Technical Series.* (2018) by Vantassel S.M. and M.A. King at USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services National Wildlife Research Center that reviews best practices for safe carcass handling and disposal methods.

The Assembly Bill 17882 signed on September 29, 2020, by California Governor Gavin Newsom, which prohibits the use of second-generation anticoagulant rodenticides (SGAR) until the Department of Pesticide Regulation's Director certifies that specific measures have been taken to reevaluate, restrict (in consultation with the California Department of Fish and Wildlife), and only use SGARs when necessary in accordance with (Section 12978.7(g) of the Food and Agricultural Code that specifies when use of second generation anti-coagulant rodenticides is allowed and necessary.

The Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 1997), which directs that each Federal agency shall make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, and shall ensure that its policies, programs, activities, and standards address these risks.

The research article entitled *Noise Pollution: A Modern Plague* (2007) by Goines and Hagler, which presents evidence for how communities are affected by noise pollution.

The resource entitled *Guidelines for Community Noise* (1999) provided by the World Health Organization that presents guidelines for reducing the effects of noise to communities.

The Executive Order 12898 entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (1994), which directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations.

The Environmental Protection Agency (EPA)'s EJSCREEN tool (an environmental justice screening and mapping tool) and/or the most recent American Community Survey from the U.S. Census Bureau (i.e., Five-Year Date Profile Estimates for 2013-2019), both of which are tools that can be used to determine the presence of minority and low-income populations within the project area of an EIS.

The presidential *Memorandum on Government-to Government Relations with Native American Tribal Governments* (1994) which outlines principles for interactions with Tribal governments, including how to summarize the results of Tribal consultation and incorporate feedback from the Tribes when making decisions regarding projects.

Section 106 of the National Historic Preservation Act, which requires that Federal agencies consider the effects of their actions on cultural resources, following the regulation at 36 CFR 800.

Section 304 of the National Historic Preservation Act which species that specific information about archeological sites and Traditional Cultural Properties (TCPs) that are sensitive and protected is redacted in an EIS and mitigation measures to these sites will be included in the EIS.

The Executive Order 13007, *Indian Sacred Sites* 1996, which requires Federal land managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners, and to avoid adversely affecting the physical integrity, accessibility, or use of sacred sites.

The guidance document entitled *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, which reviews the parts of the NEPA process that most often prompt questions.

The Federal regulation entitled 40 CFR 1502.1 which states that an EIS "shall be concise, clear and to the point" and "written in plain language…so that decisionmakers and public can readily understand them".

The Federal regulation entitled 40 CFR 1502.8 which describes how document organization is an important aspect to the navigability and readability of the EIS and is important to fulfillment of the requirement to write in concise, plain language and use concepts that are easily understandable for the public.

The court cases below were provided as examples where Federal courts recognized that the barred owl is driving northern spotted owl population declines:

- Klamath Siskiyou Wildlands Ctr. V. United States Fish & Wildlife Serv., No. 1:21-CV-00058-CL, 2022 WL 856035, at *10 (D. Or. Mar. 23, 2022);

- Friends of Animals v. United States Fish & Wildlife Serv., 879 F.3d 1000, 1001–02 (9th Cir. 2018);

- Klamath-Siskiyou Wildlands Ctr. V. Nat'l Oceanic & Atmospheric Admin., 99 F. Supp. 3d 1033, 1041 (N.D. Cal. 2015);

    - Friends of Animals v. Sheehan, No. 6:17-CV-00860-AA, 2021 WL 150011, at *1 (D. Or. Jan. 15, 2021), aff'd sub nom. Friends of Animals v. United States Fish & Wildlife Serv., 28 F.4th 19 (9th Cir. 2022);

    - Conservation Cong. V. Finley, 774 F.3d 611, 620 (9th Cir. 2014);

    - Cascadia Wildlands v. Thrailkill,
    - 806 F.3d 1234, 1241 (9th Cir. 2015);

    - Friends of Animals v. United States Fish & Wildlife Serv., 28 F.4th 19, 23 (9th Cir. 2022).

The research article entitled *The invasion of barred owls and its potential effect on the spotted owl; a conservation conundrum* (2007) by Gutierrez et al. which proposed barred owl removal experiments be conducted thoughtfully and in long term demographic study areas to assess the impacts of invasive barred owls on threatened spotted owls and suggest mitigation measures to reduce the threat based on best available science.

The research article entitled *Scientific Review of the Draft Northern Spotted Owl Recovery Plan and Reviewer Comments* (2008) by Sustainable Ecosystems Institute's (SEI) and Courtney et al. which supported replicates of a barred owl removal experiment in existing long term demographic study areas to assess the threat of barred owls and the effectiveness of removal in areas where long term demographic baseline data could be used.

Comments submitted by Douglas County and the American Forest Resources Council on the Federal Register notice entitled *Revised Designation of Critical Habitat for the Northern Spotted Owl* – 86 FR 38246, which analyze the economic impact of the northern spotted owl's revised critical habitat designation on rural communities.

The textbook entitled *Structured decision making: Case studies in natural resource management* by Runge et al. (2020). which describes the use of Structured Decision Making as a management framework that allows for an organized analysis of management decisions, which includes making decisions based on management objectives, while recognizing scientific predictions, uncertainty, and societal values. The book also describes adaptive resource management as a special case of SDM where decisions are linked over time and incorporates learning over time to improve management.

The research article entitled *An introduction to adaptive management for threatened and endangered species* (2011) by Runge, M. C. which describes how in adaptive management for threatened and endangered species, a formal, quantitative framework includes monitoring, which is explicitly linked to the management objectives.

The online article entitled *Structured decision making* (2018) by the US Geological Survey Eastern Ecological Science Center. which describes the use of Structured Decision Making as a management framework that allows for an organized analysis of management decisions, which includes making decisions based on management objectives, while recognizing scientific predictions, uncertainty, and societal values.

The book entitled *Adaptive management: The U.S. Department of the Interior Applications Guide* (2012) by Williams, B. K., and E. D. Brown., Adaptive Management Working Group, Washington, DC. which describes adaptive resource management as a special case of SDM where decisions are linked over time and incorporates learning over time to improve management.

The research article entitled *Range-wide declines of northern spotted owl populations in the Pacific Northwest: A meta-analysis* (2021) by Franklin et al. which includes analysis of lengthy past records of estimating demographic parameters for northern spotted owl populations across their range and the effects of barred owls on those parameters. It assessed population trends for northern spotted owls using 26 years of data from 11 study areas and concluded that northern spotted owl populations "potentially face extirpation if the negative effects of barred owls are not ameliorated while maintaining northern spotted owl habitat."

The report entitled *Barred owl experimental removal: Hoopa study area report to U.S. Fish and Wildlife Service* (2020) by Higley, J. M., and P. C. Carlson Hoopa Tribal Forestry, which described successful barred owl removal and included a description of how when resident barred owls are removed in particular areas, they are quickly replaced by new recruits, therefore addressing potential sources of recruitment and reduce barred owl populations in those areas while simultaneously reducing barred owl populations in the target areas can be more successful than barred owl management in a single area.

The research article entitled *Invader removal triggers competitive release in a threatened avian predator* (2021) by Wiens et al. which describes successful barred owl removal and included a description of how when resident barred owls are removed in particular areas, they are quickly replaced by new recruits, therefore addressing potential sources of recruitment and reduce barred owl populations in those areas while simultaneously reducing barred owl populations in the target areas can be more successful than barred owl management in a single area. The authors concluded that removal of barred owls had a strong, positive effect on survival of sympatric spotted owls and a weaker but positive effect on spotted owl dispersal and recruitment. The results demonstrated that the most substantial changes in population dynamics of northern spotted owls over the past two decades were associated with the invasion, population expansion, and subsequent removal of barred owls. The study provided experimental evidence of the demographic consequences of competitive release, where a threatened avian predator (northern

spotted owl) was freed from restrictions imposed on its population dynamics with the removal of a competitively dominant invasive species (barred owl).

The research article entitled. *On territorial behavior and other factors influencing habitat distribution in birds* (1970) which described a theory of how birds colonize and distribute themselves on the landscape which could be used to help in identifying the source populations of barred owl recruits by initially assumed that the areas where barred owls first colonized and established breeding populations during the invasion process will be primary sources of barred owl recruits.

The research article entitled *The barred owl (Strix varia) invasion in California*. (1998) by Dark, S. J., R. J. Gutiérrez, and G. I. Gould, Jr. which included a description of how during the invasion of barred owls into northern California, barred owls seemed to initially established breeding populations in the redwood region of northern California, such as in Redwood National and State Parks.

The research article entitled *Scientific evaluation of the status of the Northern Spotted Owl*. (2004) by Courtney et al., Sustainable Ecosystems Institute, which included a description of how during the invasion of barred owls into northern California, barred owls seemed to initially established breeding populations in the redwood region of northern California, such as in Redwood National and State Parks.

The research article entitled *Range expansion of barred owls into Redwood National and State Parks: management implications and consequences for threatened northern spotted owls* (2005) by Sakai, H., which included a description of how during the invasion of barred owls into northern California, barred owls seemed to initially established breeding populations in the redwood region of northern California, such as in Redwood National and State Parks.

The research article entitled *Exploring ecological relationships in survival and estimating rates of population change using program MARK.* (2001) by Franklin, A.B., in the book entitled *Wildlife, land, and people: Priorities for the 21st century*. by Field et al., The Wildlife Society, which describes population rates of change (λ) can be decomposed into apparent survival (ϕ) and recruitment (f) as $\lambda = \phi + f$.

The NEPA documents for the Big Pines project on the Rogue River-Siskiyou National Forest were shared as an example of a project designed to improve fire resilience, forest health, structural health, and important wildlife habitat using timber harvest as a tool to reduce stand density and achieve these desired outcomes, where the project was modified to retain habitat and for northern spotted owl and late successional habitat.

The 2011 Revised Recovery Plan for the northern spotted owl and 2019 Species Assessment by the USFWS that both recognized competition from barred owls as the primary threat to northern spotted owl survival and recovery.

The research article entitled *Reserve Design for Territorial Species: The Effects of Patch Size and Spacing on the Viability of the Northern Spotted Owl* (1994) which describes that for

territorial species such as the spotted owl, size, spacing and shape of reserved areas all had strong influence on population persistence, and reserves that could support a minimum of 20 spotted owl territories were more likely to maintain spotted owl populations than smaller reserves.

US Forest Service Manual guidance including Section 2323.3 of FSM 2300 – Recreation, Wilderness, and Related Resource Management, includes objectives and policy guidance related to wildlife management including the objective to "provide protection for known populations and aid recovery in areas of previous habitation, of federally listed threatened or endangered species and their habitats" and gives Regional Foresters the authority to "approve other wildlife damage control projects on a case-by-case basis if necessary to protect federally listed threatened or endangered species or for public health and safety." It includes language related to "predator control projects" that "remove the offending individuals."

US Forest Service Manual guidance including Section FSM 2323.33a which provides guidance to "Reintroduce 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."

The biological opinion issued by the U.S. Fish & Wildlife Service associated with the BLM Resource Management Plan (RMPs) (2016) which stated that "the positive contributions of barred owl management offset the adverse impacts of the [Proposed RMP] to spotted owls and enable long-term spotted owl recovery on BLM lands" and describes how sustained yield timber management as described in the RMPs is contingent on these contributions.

The court case entitled Am. Forest Res. Council v. Hammond, 422 F.Supp.3d 184, 191 (D.D.C. 2019), appeal docketed, Nos. 20-5008, 20-5009 (D.C. Cir. Jan. 24, 2020) (holding "BLM must ensure that the timber produced on O&C land is sold, cut, and removed in conformity with the principle of sustained yield" and that the 2016 RMPs violated the O&C Act by reserving land from sustained-yield timber production).

The research article entitled *Arresting the spread of invasive species in continental systems* (2022) by Hofstader et al. paper, which the authors describe as a rare conservation success: the regional-scale removal of an invasive predator – the barred owl (*Strix varia*) – to benefit the spotted owl (*Strix occidentalis*) in California. In the study barred owl site occupancy declined sixfold, from 0.19 to 0.03, following 1 year of removals, and site extinction (0.92) far exceeded colonization (0.02). Spotted owls recolonized 56% of formerly occupied territories within 1 year, contrasting starkly with removals conducted after barred owls achieved high densities in the Pacific Northwest. The authors concluded that the study therefore averted the otherwise likely extirpation of California spotted owls (*Strix occidentalis occidentalis*) by barred owl competition. Collectively, leveraging technological advances in population monitoring, early intervention, targeting defensible biogeographic areas, and fostering public–private partnerships will reduce invasive species-driven extinction of native fauna in continental systems." The study concluded that removal of barred owls as a management strategy will likely require long term sustained removal actions if barred owls are to be either prevented from expanding their range or kept at such low numbers that they are not a significant threat to the spotted owl.

The comments of the Olympic Forest Coalition (OFCO) on the Habitat Conservation Plan for the Washington State Department of Natural Resources' (DNR) Trust Lands including the Olympic Experimental State Forest made on July 29, 2022 which note "The northern spotted owl biological opinion [for DNR's Trust Lands Habitat Conservation Plan] contains no mention of the impacts of invasive barred owls. Since 1997, the Service has repeatedly determined that barred owls are a leading threat to the continued existence of northern spotted owls." The comments note that the Service should reevaluate the protections of the HCP in light of the pressing threat of barred owls.

The Habitat Conservation Plan for Northern and California Spotted owl. Sierra Pacific Industries (SPI), Forestland Management Program in the Klamath, Cascade and Sierra Nevada Mountains, California (2020, updated via minor modification in 2021) by SPI and USFWS, which includes conservation measure #8 that addresses barred owl as a stressor on spotted owls for the 50-year life of the HCP. Multiple scientific studies on barred owl removal have been conducted under this HCP and State and Federal permits since 2018 and has maintained very low densities of barred owl while maintaining stable to increasing populations of spotted owls (both northern spotted owl and California spotted owl). The initiation of lethal collections of barred owls within the range of northern spotted owl under the HCP project area has helped maintain one of the last few stable populations of northern spotted owl and has likely delayed or prevented future extirpation of California spotted owl according to the study by Hofstader et al. 2022 (referenced earlier in this document).

The Master's thesis entitled *A model to evaluate barred owl removal strategies for the conservation of northern spotted owls* (2016) by Baumbusch, R. C. which described how larger removal areas afford greater conservation benefits to spotted owls. Larger removal areas also means cumulatively fewer barred owls need to be removed to achieve the same conservation benefit.

The research article entitled *Removing barred owls from local areas: techniques and feasibility* (2014) by Diller et al., which described lethal barred owl removal as both feasible and effective in addressing barred owl invasion. The study reported on initial barred owl removal experiments by Green Diamond, and noted that "Most barred owls were collected within one-half hour of arrival at a site. Lethal removal of barred owls was rapid, technically feasible, and cost-effective."

The research article entitled *Demographic response of northern spotted owls to barred owl removal* (2016) by Diller et al. which describes how northern spotted owls demonstrated the greatest demographic response when barred owl invasion was arrested before widespread and high-density occupation of an area. The paper also described how the northern spotted owls that were formerly residents but had been pushed into non-resident status or "floater" status by barred owl competition, often would reoccupy historic activity centers and begin to reproduce again once barred owls were removed,

The report entitled *Barred Owl removal report 2007–2016. Prov. B.C., Victoria, B.C. Tech. Rep. 128* (2020) by Gillis, J. and F.L. Waterhouse, which describes non-lethal removal as both more difficult, more expensive, and less effective.

The research article entitled *Potential trophic cascades triggered by the barred owl range expansion* by Holm et al (2016), which cautions that barred owl invasion impacts other native wildlife, so much so that barred owls may trigger a "trophic cascade" by increased predation pressures on both primary and secondary prey populations.

The report entitled *Threats to the viability of California Spotted Owls. USDA Forest Service Technical Report PNW-GTR-254* (2017) by Keane, J. J. which describes that although range expansion of the barred owl into California spotted owl territory is more recent, data suggests that California spotted owls will be negatively impacted in a manner similar to its cousin, the northern spotted owl.

The research article entitled *Early detection of rapid Barred Owl population growth within the range of the California Spotted Owl advises the Precautionary Principle* (2020) by Wood et al. which describes that although range expansion of the barred owl into California spotted owl territory is more recent, data suggests that California spotted owls will be negatively impacted in a manner similar to its cousin, the northern spotted owl.

A letter in Science *entitled Maximizing Endangered Species Research* (2012) by Rosenberg et al. describing comments on the Draft Environmental Impact Statement for Experimental Removal of Barred Owls to Benefit Threatened Northern Spotted Owls. This letter largely criticized the proposed experimental removal due to cost and scale and proposed that it would be ineffective and unnecessary. The letter also noted that it is important to implement management at a scale that benefits spotted owls.

The research article entitled Transient dynamics of invasive competition: Barred Owls, Spotted Owls, habitat, and the demons of competition present (2011) by Dugger et al. which noted that "some Spotted Owl pairs retained their territories and continued to survive and successfully reproduce during our study even on territories where Barred owls were present, meaning that the potential for northern spotted owl to exist in refugia was thought to be a possibility at that time, but that was prior to additional research being conducted on the extent of overlap in habitat between northern spotted owl and barred owl.

The National Environmental Policy Act (1970) enacted by Congress, and all Federal regulations pertaining to NEPA, which requires an agency to prepare an environmental impact statement (EIS) prior to taking action significantly affecting the quality of the human environment.

87 Fed. Reg. 43888 which required description of a "No Action Alternative."

The court cases below which reiterated the need for an agency to take a "hard look" at the impacts of an action prior to making a final decision whether it prepares an Environmental Assessment (EA) or an EIS:

- Baltimore Gas & Elec. Co. v. Natural Res. Defense Council, 462 U.S. 87, 97-98 (1983);

- Kootenai Tribe of Idaho v. Veneman, 313 F.3d 1094, 1115–16 (9th Cir. 2002), overruled in part on other grounds,

- Wilderness Soc'y v. United States Forest Serv., 630 F.3d 1173, 1178–79 (9th Cir. 2011).

Federal regulation 42 U.S.C. 4332(2)(C) which requires agencies to adequately evaluate all potential environmental impacts of proposed actions in the NEPA process.

The court case Idaho Sporting Congress v. Thomas,137 F.3d 1146, 1149 (9th Cir. 1998). Which determined that the agency must provide "a reasonably thorough discussion of the significant aspects of the probable environmental consequences.

Federal regulations 42 U.S.C. 4332(2); see also 40 CFR. 1508.7-1508.8. that specified agencies must identify and disclose to the public all foreseeable impacts of the proposed action, including direct, indirect, and cumulative impacts.

The Federal regulation 16 U.S.C. 703. a part of the Migratory Bird Treaty Act (MBTA) which makes it illegal to "pursue, hunt, take, capture, [or] kill . . .." any migratory bird or "any part, nest, or egg of any such bird ..., by any means or in any manner."

The Federal regulation 16 U.S.C. 704 (b). a part of the MBTA which authorizes the Secretary of Interior to adopt regulations that permit the limited killing of protected birds "subject to the provision and in order to carry out the purpose of the Conventions . . . with due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds . . . if at all, and by what means, it is compatible with the terms of the Conventions . . .."

The court case ruling from Alaska Fish & Wildlife Federation & Outdoor Council, Inc. v. Dunkle, 829 F.2d 933, 940, (9th Cir., which concluded that a take of migratory birds covered by the MBTA is allowed only when consistent with the Conventions underlying the MBTA 1987).

The MBTA and the Conventions, which were enacted for the very purpose of promoting the protection and conservation of migratory birds, examples follow below*:*

- The Convention between the U.S. and Great Britain (for Canada) for the Protection of Migratory Birds, U.S.-G.B., preamble, Aug. 16, 1916, T.S. No. 628, Preamble (entering Convention "for the protection of migratory birds. . . being desirous of saving from indiscriminate slaughter and insuring the preservation of such migratory birds");

- The Convention Between the U.S. and the United Mexican States for the protection of Migratory Birds and Game Mammals, U.S.-Mex., preamble, Feb. 7, 1936, 50 Stat. 1311, Preamble (which acknowledges "it is right and proper to protect the said migratory birds, whatever may be their origin");

- The Convention between the U.S. and Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, US-Tokyo, March 4, 1972, 25 U.S.T. 3329, Preamble (entering Convention "for the protection of migratory birds and birds in danger of extinction");

- The Convention Between the U.S. and the Union of the Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment, Nov. 19, 1976, U.S. –U.S.S.R, 29 U.S.T. 4649, Preamble ("desiring to cooperate in implementing measures for the conservation of migratory birds and their environment").

The decision from the court case Missouri v. Holland, 252 U.S. 416, 434-35 (1920); see also United States v. Richards, 583 F.2d 491, 495 (10th Cir. Utah 1978). where the Supreme Court found that the Conventions and the MBTA involve "a national interest of very nearly the first magnitude."

The Japan Convention, Art. III; Soviet Convention, Art. I. In applying the conservation mandate of the MBTA, the terms of the Conventions explicitly limit the circumstances in which it is permissible to issue a permit to those situations "not inconsistent" with the objectives of the parties to the Conventions, which includes the United States and its agencies, such as FWS.

Canadian Convention, Art. II. As an example, the Amended Canadian Convention provides that "the taking of migratory game birds may be allowed at any time of year for scientific, educational, propagative, or other specific purposes consistent with the conservation principles of the Convention."

The Federal regulation 50 CFR. 21.12(a). which includes an exception to the permitting requirement when Department of Interior employees performing their official duties.

The Federal registration notice 87 FR 43886, in which the FWS states in the Notice that the purpose of the Barred Owl Management Strategy is to protect the populations of spotted owl species in Washington, Oregon and California.

The court case United States v. Smith, 499 U.S. 160, 167 (1991); Far West Fed. Bank, S.B. v. Director, Office of Thrift Supervision, 951 F.2d 1093, 1097 (9th Cir. 1991). supported that the purpose of the MBTA, which is to promote action that is "consistent with the conservation principles of the Convention" without exceptions beyond those specifically listed.

The research article entitled *Demographic response of northern spotted owls to barred owl removal. Journal of Wildlife Management* (2016) by Diller et al. which found that removal of barred owls at low densities from areas occupied by northern spotted owls found a positive change to the area.

The research article entitled *The past and future roles of competition and habitat in the range-wide occupancy dynamics of Northern Spotted Owls.* (2019) by Yackulic et al., which describes substantial evidence showing the negative impacts to northern spotted owl populations by barred owls and notes that in areas with high barred owl populations, the probability of northern spotted owl persistence is low without management intervention.

Appendix 6: Responses to Comments on the Draft EIS and Draft Barred Owl Management Strategy

The U.S. Fish and Wildlife Service (Service) developed a proposed Barred Owl Management Strategy (Strategy) to address the threat of the nonnative, invasive barred owl to the native northern spotted owl and California spotted owl. In accordance with the National Environmental Policy Act, the Service published the draft environmental impact statement (DEIS, USFWS 2023a) evaluating the impacts on the human environment related to the proposed management strategy in the Federal Register on November 17, 2023, and invited public comments on both the proposed management strategy and DEIS.

During the 60-day comment period, the Service received 8,613 comment letters on these documents through Regulations.gov, including more than 8,000 comments based on a single template letter. Four comments were received by U.S. Mail after the comment period closed. Following a careful review of the comments on both documents, the Service identified those comments containing substantive comments. Similar comments were combined into a single comment summary. The Service, with support from the Cooperating Agencies, then developed responses to each summary comment.

In the following document, comment summaries and responses are separated by those primarily relevant to the Draft EIS and those primarily focused on the Draft Strategy, and then grouped by subtopic. While individual commenters are not identified in the summaries below, the full comments are all available on Regulations.gov under the docket FWS-R1-ES-2022-0074-0048, or available upon request.

A6.1 Comments Primarily on the DEIS

A6.1.1 DEIS Comments - Purpose and Need

Comment 1

Several commenters stated that the purpose and need is too narrow and thus the range of reasonable alternatives analyzed in the DEIS was too limited. They recommend expanding the purpose and need of the proposed action to include improving the survival and recovery of northern spotted owls and to prevent the decline of California spotted owls, and then expanding the range of alternatives to include other management strategies for providing and protecting suitable habitat such as: halting the logging of ancient forests, restoring, or creating habitat, or other management practices to reduce habitat loss. One commenter recommended that the Service consider an alternative that emphasizes the mitigation of habitat loss by addressing the impacts of the logging industry and property development in and around areas that spotted owls inhabit.

Response 1

The Service has addressed how to improve the survival and recovery of the northern spotted owl through its recovery plan for the species, which in addition to discussion about habitat protection, included a recommendation to specifically address management of the barred owl given the negative competitive interactions between the species. That competitive interaction is also

considered a threat to the California spotted owl, a species proposed for listing. The Service has appropriately described the particular problem it is seeking to address in this purpose and need statement, and has evaluated a reasonable range of alternatives in response. The Council on Environmental Quality (CEQ) regulations state that the purpose and need "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR 1502.13). The focus of the purpose and need is on the threat from barred owls.

As the recovery plan makes clear, a continued focus on habitat conservation and active forest restoration by landowners and managers will be a critical part of recovery of this species; however, these types of actions are outside the scope of this action. The Service considered but did not analyze in detail an alternative based on habitat management and explained, "[o]ther threats, such as habitat loss, are being addressed through other processes, such as the Recovery Plan for the Northern Spotted Owl, the Conservation Strategy for the California Spotted Owl, Federal land management plans, and critical habitat designations" (USFWS 2023, p. 51).

A6.1.2 DEIS Comments - Alternatives

Comment 2

One commenter requested that the Strategy clearly state where barred owls could be removed and suggested that this should include lands of willing landowners with resources for conducting removal even outside of high priority areas.

Response 2

We have clarified the priority approach in the Strategy and Alternative 2, noting that barred owl management may occur in any mapped area, regardless of its priority status. In areas outside of mapped General Management Areas (GMA) and Special Designated Areas, landowners and land managers may choose to manage spotted owl sites under the spotted owl site management approach described in Strategy.

Comment 3

One commenter recommended the Service focus Alternative 2 on fewer management areas and delineate and prioritize those GMAs and Focal Management Areas (FMA) where barred owl management would be the most impactful during the 30-year analysis period covered in the DEIS.

Response 3

Alternative 4 provides the more focused implementation on a smaller number of GMAs, thus substantially addressing the recommendation to limit barred owl management to the higher priority of GMAs. Alternative 2 includes guidelines for prioritization of management to assist entities that are interested in funding or carrying out barred owl management under the Strategy in selecting among multiple options within a given province. Appendix 4 of the Strategy (Alternative 2) provides recommendations and considerations for selecting FMAs related to size and other factors that affect success to assist in the placement of FMAs. Therefore, the recommendations provided by the commenters are analyzed in the EIS.

Comment 4

One commenter suggested it would be more effective to focus more tightly on large areas of contiguous or only minimally fragmented old growth habitat, rather than smaller and more isolated sites, to increase the potential for success.

Response 4

The Service interprets this comment as a suggestion to analyze in detail an alternative that would focus barred owl management on large areas of contiguous or only minimally fragmented old growth habitat, rather than smaller and more isolated sites. CEQ regulations state, "Reasonable alternatives means a reasonable range of alternatives that are technically and economically feasible, and meet the purpose and need for the proposed action" 40 CFR 1508.1(z). The Department of the Interior National Environmental Policy Act (NEPA) regulations explain that an EIS must analyze "… all reasonable alternatives, or when there are potentially a very large number of alternatives then a reasonable number of examples covering the full spectrum of reasonable alternatives …" 43 CFR 46.420(c)). The EIS includes a reasonable number of examples covering a spectrum of reasonable alternatives. Alternative 4 in the EIS focuses on fewer large areas (GMAs) and Alternative 6 is designed to focus barred owl management on areas with the best remaining conditions, which is substantially similar to the commenters' suggested alternative of focusing barred owl management on large areas of contiguous or only minimally fragmented old growth habitat.

Comment 5

One commenter recommended developing a stronger set of actions in California and along the border with Oregon to protect the relatively healthier populations of northern spotted owls and protect California spotted owls should efforts in Oregon and Washington fail.

Response 5

The EIS includes Alternative 6, which is designed to focus barred owl management on best remaining conditions. This alternative is substantially similar to the commenters' suggested alternative of focusing barred owl management in California and along the border with Oregon.

Comment 6

One commenter suggested the Service revise the Proposed Action to incorporate additional Wilderness Areas within GMAs.

Response 6

In general, we included Congressionally-designated Wilderness Areas within GMAs, making them available for inclusion in FMAs, where they provided spotted owl habitat. The Service excluded wilderness areas that generally had little or no spotted owl habitat or were too remote for barred owl removal to be practical or efficient.

Comment 7

Three commenters noted the confusion created by different levels of barred owl management in different areas depending on their priority in Alternative 1. They noted that new information, such as the survey location of new extant owl sites, may lead implementers to focus on management in blocks that are currently lower priority and where the limitation on the percentage of area under barred owl management in the block from Alternative 2 could limit such management. Another commenter suggested that we allow complete barred owl removal across the entire range of the northern spotted owl and expressed concern that the limiting management to a maximum of 50 percent of the area could prevent interested landowners from conducting larger scale removal under the proposed action.

Response 7

The Service designed barred owl management to be limited to different percentages of each area depending on its priority to encourage initial management in those areas that we believe to have the best potential for such management while still allowing willing landowners or land managers to implement management on lower priority sites. Secondarily, the Service intended this to avoid spreading such block-based management too thinly across large areas in the initial years, thereby further limiting the ability of spotted owl populations to interact between management areas.

We acknowledge that new information could change the focus of such areas. Therefore, we have modified the Strategy (and Alternative 2) to allow for barred owl management on 50 percent of the total area within the collective GMAs in each physiographic province. This allows for management to occur at higher levels in one block area, while still encouraging management across all provinces.

Comment 8

Four commenters suggested the Service review and further explore the use of non-lethal methods, including translocation of barred owls, hazing, and reproductive interference. One commenter suggested the Service further review translocation of barred owls to their native eastern habitat, as described in Buchanan et al. 2007.

Response 8

We considered but did not analyze in detail alternatives based on non-lethal removal methods or reproductive interference. The EIS explains that these would not be reasonable alternatives because they would not respond to the purpose and need for the proposed action and would not be technically feasible. Section 2.10.4 and 5 of the EIS describes the Service's consideration of potential nonlethal removal methods in light of the purpose and need described in Section 1.2.

Buchanan et al. (2007, p. 683), cited by the commenter, suggested that the possibility of translocation to the historic range should be carefully evaluated but did not conduct such an evaluation. As described in the EIS (Section 2.10.4), the Service previously evaluated the potential for translocations by reaching out to wildlife agencies within the historic range of the northern barred owl. None of the responding States expressed interest in receiving captured western barred owls based on lack of empty habitat, concern about the potential of

transmission of disease, and likely differences in local genetic adaptation after 100 years of different selective pressures in the west, coupled with the desire to avoid diluting native gene pools.

Comment 9

One commenter recommended evaluating the option of using both reproduction control and lethal removal in tandem. They include nest removal and removing/oiling eggs as potential reproductive control.

Response 9

The Service, in Section 2.10.5 of the EIS, discusses reproductive interference. While reproduction control could theoretically reduce the number of barred owls produced on the landscape, it does not remove the territorial barred owls, leaving the area unavailable to spotted owls. Thus, in areas where barred owl competition is suppressing spotted owl populations, this would not result in improvements in spotted owl populations. Further, to be effective, reproduction control would likely have to be conducted at least annually.

There are operational barriers to nest removal or egg destruction. Barred owl nests can be difficult to locate. Barred owls nest in a large cavity created by rot in a large tree or a large abandoned stick nest. Accessing cavity nests to oil or remove eggs under these conditions is difficult and often unsafe. Even large stick nests are frequently found in trees that are unsafe to climb. Removal of nests in cavities is often not possible due to the depth of the cavity. Finally, spotted owls use the same types of nests as barred owls, so removing nests could affect the spotted owl's ability to nest in the area and therefore could limit spotted owl conservation. As noted above, a reasonable alternative must be technically and economically feasible, and must respond to the purpose and need. Because nest removal or egg destruction would not be technically and economically feasible, the Service did not consider this a reasonable alternative.

Comment 10

Several commenters stated that the DEIS does not present a reasonable range of alternatives because all alternatives involved lethal removal and issuance of a Migratory Bird Treaty Act (MBTA) take permit, and the Service did not consider "less harmful" alternatives focused on non-lethal control methods such as reproductive interference, capture and translocation.

Response 10

The Service developed a range of alternatives to address the purpose and need described in Chapter 1 of the EIS, focused on implementation of Recovery Action 30, and designed to address the threat to the spotted owl from barred owl competition. The Service considered non-lethal control methods as described in the EIS Section 2.10 Alternatives Considered and Eliminated from Detailed Analysis and describes the basis for the decision for each alternative. In Sections 2.10.4 and 2.10.5 the Service describes the range of non-lethal options available for use and why we did not fully analyze these options.

Comment 11

One commenter notes that the Service rejected many of the non-lethal options because they did not act quickly, that is, they required more than a decade to reduce barred owl populations. However, the commenter noted that the proposed action addresses barred owl populations over a thirty-year period.

Response 11

The commenter incorrectly conflated the time required to begin reducing barred owl competition on a site using reproductive interference (10 years if the barred owls are sterilized but left on site until they die) with the duration of the analysis period for the EIS. Non-lethal options that leave the territorial barred owl on site, even if they cannot breed, result in continued competition for space and prevent spotted owls from reclaiming the site. Because barred and spotted owl lifespans are similar, even if the spotted owl could survive without a territory, they would also likely be dead by the time the territory becomes available for recolonization upon the death of the barred owl. Lethal removal eliminates the competition immediately, and therefore provides more options for spotted owls to reclaim sites. While the continued production and the long dispersal distances of barred owls will require ongoing management in many areas, this is different than waiting for a decade before seeing any opportunity for improvement. As stated in Section 3.1 of the EIS, we chose a temporal scale of analysis of 30 years because it represents two lifespans of a spotted owl and allows sufficient time to predict and analyze discernable differences in effects to resources across alternatives.

Comment 12

One commenter suggested a new alternative (Alternative 7 - Highest Likelihood of Success) consisting of Alternative 6 (Management focused on Best Conditions) for the northern spotted owl, amended to include all of the California spotted owl's range.

Response 12

The proposed new alternative includes a combination of approaches that already appear in two fully analyzed alternatives - Alternative 6 in the northern spotted owl range, and Alternative 2 for the California spotted owl range. Because analyses were conducted and summarized by subspecies in the EIS, the analysis of such an alternative already exists. Thus, analyzing a separate alternative would not meaningfully add to the range of alternatives in the EIS.

Comment 13

One commenter recommended the Service consider limiting removal to current or historic spotted owl sites, or in designated critical habitat for spotted owls, resulting in more limited implementation.

Response 13

Limiting barred owl management to northern spotted owl sites and designated critical habitat is addressed in Section 2.10.3 of the EIS. As we noted in that section, northern spotted owl critical habitat has a 91 percent overlap with Alternative 2 management areas and falls within the effect described in Alternative 2. Management of spotted owl sites is also contained in Alternative 2.

Finally, designated critical habitat is limited to the northern spotted owl range, thus, this approach would not meet the purpose and need in the California spotted owl range.

Comment 14

One commenter stated that the Service failed to consider alternatives that would study whether barred owls can coexist with spotted owls without removal. They recommended that the Service evaluate an alternative that considers the interaction between barred owls and spotted owls in a non-lethal manner and study how the species are coexisting in certain areas as a way to focus forest restoration that could further aid the recovery of spotted owls.

Response 14

The commentor suggests an alternative based on study, rather than agency action. The purpose of this action is to reduce barred owl populations to improve the survival and recovery of northern spotted owls and to prevent declines in California spotted owls from barred owl competition. The recommendation to study whether barred owls can coexist with spotted owls without removal is largely captured by the No Action alternative, which the DEIS analyzed in detail.

The Service considers but does not analyze in detail other alternatives based on non-lethal removal methods. As explained in the EIS, these alternatives would not be reasonable because they would not respond to the purpose and need for action and would not be technically feasible.

The Service considered but did not analyze in detail alternatives based on habitat management, such as forest restoration. As explained in Section 2.7, these alternatives would be outside the scope of the action.

As described in the proposed Strategy and EIS, multiple studies across the range of the northern spotted owl, and in the northern Sierra Nevada Mountains of the California spotted owl range counter the commenter’s assumption that spotted owls can survive and thrive (co-exist) once barred owl populations are well established (Franklin et al. 2021, pp .13-18). Some studies have identified minor differences in habitat preference between barred and spotted owls in the early stages of invasion, but have not identified any habitats where spotted owls have a competitive advantage over barred owls (Hamer et al. 2007, pp. 756-765; Wiens et al. 2014, pp, 20-37). The lack of niche separation, combined with habitat and prey overlap, demonstrates that at least at high densities of barred owls, coexistence does not support spotted owl survival, let alone recovery. However, under the proposed action, barred owls will remain unaffected within large areas, including areas outside of barred owl management blocks (GMA and Special Designated Areas) without spotted owl sites (where site management could occur) and in inaccessible areas. The proposed action does not prevent interested entities from conducting research on coexistence of spotted and barred owls.

Comment 15

One commenter recommends a more limited approach focusing on remnant spotted owl populations that are not yet overrun by barred owls.

Response 15

The commenter did not specify any particular approach to focusing on areas where spotted owls are not overrun by barred owls. Alternative 6 in the EIS focuses specifically on physiographic provinces with shorter or more limited barred owl impacts.

Comment 16

Two commenters suggested management of barred owl populations in southern Sierra Nevada and the coastal mountains south of San Francisco to prevent them from spreading further south into the Coastal/Southern California range of the California spotted owl.

Response 16

The proposed Strategy (Alternative 2) includes removal of any barred owls detected in the California Coast Ranges south of San Francisco and in the area between the California spotted owl range in the Sierra Nevada and the Coastal-Southern California populations to the south and west. Barred owl removal within the entire range of the California spotted owl, which includes the southern Sierra Nevada as well as the Coastal-Southern California population, is a high priority action in the proposed Strategy (Alternative 2).

Comment 17

One commenter stated that the first priority should be to manage barred owls in the California spotted owl range to prevent them from becoming established.

Response 17

The proposed Strategy (Alternative 2) includes removal of any barred owls detected in the range of the California spotted owl as a priority A action for the subspecies.

Comment 18

One commenter stated that the proposed Strategy cannot be legally applied to the California spotted owl because the subspecies in not listed under the ESA and threats to the California spotted owl are unrelated to barred owls.

Response 18

The Service is not limited to only addressing the conservation needs of ESA listed species in the proposed Strategy. As described in the Section 1.3 of the EIS, the MBTA gives the Service broad authority to protect migratory birds, but also to regulate their taking. The barred owl is a threat to the California spotted owl, and competition from barred owls is one of the reasons the Service has proposed to list the California spotted owl under the ESA. In Section 3.3 of the EIS the Service describes the impact of each Alternative on barred owl populations, displaying the impact of maximum implementation on barred owl populations from a regional and range-wide perspective. These results show that even at the maximum impact on range-wide barred owl

populations (Alternative 3), the removal would represent less than one percent of the global barred owl population.

Comment 19

One commenter suggested that the Service should consider the outcomes of each alternative under less than full implementation.

Response 19

The analysis of alternatives in the EIS are designed to allow comparison of the impacts between alternatives. To do so effectively we use the same assumptions. For negative effects, such as those to barred owls, using the maximum management area allowed under each alternative allows the Service and the reader to understand the greatest possible impacts. For resources positively impacted by management, such as spotted owls, this provides an estimate of the greatest estimated value under each alternative. And because we use the same assumptions across all analyses, this demonstrates the difference between alternatives.

The estimates of impacts to the various resources are primarily driven by the area under barred owl management. If the Service assumed 50 percent implementation or 25 percent implementation under each alternative, the resulting differences would be numerically smaller, but fully comparable between alternatives. Therefore, we are not providing multiple assumptions of the level of implementation in the analysis.

Comment 20

Two commenters recommended the Service modify Alternative 2 such that no barred owls be killed in National Park Service units. They noted that several National Park Service units are within areas in which barred owl management could occur under Alternative 2. They expressed concern for impacts to visitor expectations and visitor safety. One commenter expressed particular concern that private individuals would be deputized to kill barred owls in National Parks.

Response 20

The Service included options for barred owl management across the range of the northern and California spotted owls based on landscape conditions. The Strategy allows for, but does not require, implementation on specific areas covered by the Strategy, including within National Park units. Therefore, the recommended change is within the potential implementation of Alternative 2 and is an unnecessary variation within the spectrum of the alternatives.

Each agency administering lands within the northern and California spotted owl ranges can implement the Strategy within its respective authorities and regulations. They retain the authority to determine if and how the Strategy will be implemented, subject to approval from the Service. For example, Strategy implementation requires adherence to the safety elements of the removal protocol (see Appendix 2). Agencies will select removal specialists with the training and experience required under the removal protocol in the Strategy and the Service's MBTA permit, subject to approval from the Service. They may also apply additional safety measures in accordance with their resources, authorities, laws, regulations, and policies.

Comment 21

One commenter suggested inclusion of a 15-mile buffer in Alternative 2, as in Alternative 3, to prevent further barred owl colonization while another recommended extending the area available for barred owl removal around spotted owl habitat, noting that barred owl juveniles can disperse further than 15 miles.

Response 21

We concur that barred owl juveniles can disperse more than 15 miles. The 15-mile buffer in Alternative 3 was designed to allow for interested landowners or land managers to act to reduce, but not eliminate, the presence of breeding barred owls near the range of the spotted owl and therefore reduce the number of barred owl young available disperse into the area. However, the area beyond the range of the spotted owl is generally lower quality habitat for barred owls also due to dry conditions east of the Cascades and Sierra Nevada. We note the 15-mile buffer is part of Alternative 3 which was analyzed in detail in the EIS.

Comment 22

One commenter noted the recommendation to add monitoring in potential invasion pathways. They provided examples of current acoustic monitoring of California spotted owls on National Forest lands within invasion pathways overlap and suggested the EIS could further describe how enhanced monitoring may help inform managers about barred owl migration patterns, as well as describing who would be responsible for conducting this monitoring.

Response 22

The Service acknowledges the ongoing monitoring on National Forests within the potential invasion pathways into the California spotted owl range. The recommendation for added monitoring and inventory in the potential invasion pathways into the California spotted owl range includes forested lands outside of the National Forests where inventory and monitoring may be more limited. We note that the recommendation for the additional monitoring in the primary dispersal pathways would allow for early detection of barred owl presence during the period before barred owls establish populations, which limits the number of barred owls that will be removed while preventing negative barred owl effects to California spotted owls. All actions recommended under the Strategy would be voluntary actions conducted by willing implementers, so additional monitoring could be conducted by any interested landowner or land manager.

A6.1.3 DEIS Comments – Approach to EIS Analysis

Comment 23

One commenter expressed concern that public access and recreation could be impacted by the management strategy. They noted that road use and recreation have been restricted by protection of the northern spotted owl.

Response 23

As stated in the EIS, the Strategy does not change underlying land management under current land use plans. Most restriction of access and visitor use is related to these underlying land management plans, and not specific to the location of individual spotted owls. Therefore, the increase in occupied spotted owl sites should have little effect, if any, on access and recreation. The actions described in the EIS can generally be applied in concert with existing land management, though specific land management decisions would remain the responsibility of the respective management agency. As described in Section 3.6 of the EIS, the primary mechanism for effects to recreation or access under the Proposed Action includes the presence of small crews on the ground and the sound of firing the shotgun at barred owl sites, which could disturb visitors and recreationists, especially in areas where gunshots are not typically heard or expected. However, effects to access and recreation are not expected to be significant.

Comment 24

One commenter requested the Service better describe uncertainty associated with barred owl removal on northern spotted owl populations, including adding confidence intervals to spotted owl population projections.

Response 24

We have provided additional context to Section 3.4.1 of the EIS regarding the range of outcomes for spotted owl populations that may occur in response to barred owl removal. As noted in the text, the quantitative analysis provided in Section 3.4 assumes a spotted owl population growth rate of 0.5% in areas where barred owls are removed. This growth rate was selected because it is within the range of spotted owl population responses that researchers documented during barred owl removal experiments and provides a good illustration of the potential effects allowing for comparison between alternatives. We fully expect spotted owl population growth rate will vary across time and area. However, the population model we used was deterministic, and does not allow for confidence intervals.

Comment 25

Commenter suggested the draft Strategy will disrupt habitat and may lead to more aggressive barred owls recolonizing these open territories and further disrupting the remaining spotted owls.

Response 25

The commenter provided no data or information to support their contention that the removal of existing barred owl territories will encourage recolonization by even more aggressive barred owls, and these may actually cause more harm to the remaining spotted owls. None of the various studies of barred owl removal have documented any increase in aggression by barred

owls recolonizing site following initial removal. In fact, all past studies found improvements in spotted owl population dynamics, by increases in apparent survival, recolonization of previously occupied sites by spotted owls, and/or increases in recruitment (See Diller et al 2016, p. 702-3; Wiens et al 2021, p. 5; Higley et al. 2023, p. 10; and Hofstadter et al. 2022, p. 282 and USFWS 2023a, Section 2.3.1)

Comment 26

One commenter notes that the data used to estimate barred owl densities did not include any data from western Washington and that this underestimated the actual number of barred owls in the Pacific Northwest. They cited information in a personal correspondence they received from a researcher on Bainbridge Island.

Response 26

In estimating barred owl densities, we used the best available information on barred owl population densities from published studies. We selected data from the study area that best fit the conditions in the provinces to estimate barred owl populations in each province. We do not have the density data from Jamie Acker (personal correspondence) cited by the commenter and therefore cannot determine whether this information is consistent with the density data from other studies. His published paper (Acker 2012, entire) does not include an estimate of barred owl density. We note that Bainbridge Island includes substantial human habitation including urban areas and may not provide the best comparison to managed forest lands common in the barred owl management areas in the Strategy. Densities of barred owls in the Oregon Coast Ranges are the highest recorded in any available study, and forest conditions are similar to conditions in western Washington. Therefore, this remains the best available estimate of barred owl populations.

Comment 27

One commenter suggested that the dispersal distance of barred owls described in the EIS as "50 miles or more" was, in fact, an underestimate, based on personal communication with Jamie Acker concerning barred owl work on Bainbridge Island. Two banded barred owls traveled 82 and more than 250 miles each. The commenter believes this would change implications for certainty, magnitude, and frequency of barred owl colonization of spotted owl habitat.

Response 27

While some individual barred owls do make long distance dispersal movements, as has been documented in the past, many do not. The estimate provided in the EIS of 50 or more miles encompasses these individual long-distance dispersals. Previous literature has documented some very long-distance dispersal for individual barred owls. For the EIS, the Service based the colonization and recolonization rates on extrapolation of direct data collected on the previous barred owl removal experiments. Therefore, the dispersal distanced described are within the values estimated in the past and do not affect the analyses in the EIS.

Comment 28

One commenter pointed to a study by Bodine and Capaldi (2017) indicating that barred owl removal would have to be near complete and repeated regularly in order to benefit spotted owls.

Response 28

We agree with the commenter's characterization of the conclusions of the mathematical modeling study by Bodine and Capaldi (2017, entire). However, the scope of this study limits its utility in predicting outcomes of barred owl management for spotted owl populations. First, the models used in the study were selected to fit data only from the Oregon Coast Ranges Demographic Study Area. The authors noted that using data from other regions might result in different model outcomes. Second, the study represented barred and spotted owl population dynamics using simplistic models that leave out important biological processes that may affect real-world outcomes, including differences in food and habitat use, immigration, and emigration. Lastly, a more detailed analysis of similar data from all study areas yielded different results, including high likelihood of spotted owl persistence with barred owl removal and adequate habitat amounts (Yackulic et al. 2019, entire). Regardless of the study's flaws as a tool to predict the outcomes of barred owl management throughout the northern spotted owl range, we agree that near-complete removal repeated annually will increase the chances of success. Experimental barred owl removal has demonstrated the potential for near-complete removal within study areas (upwards of 90% removal; see A3.1.2 Annual Rate of Removal of Territorial Barred Owls).

Comment 29

One commenter questioned the estimates of spotted owl populations under Alternative 2 based on potential faults with the barred owl population and dispersal data.

Response 29

The estimate of spotted owl population trend in Alternative 2 is based on the starting population, the percentage of the forest lands that could be under barred owl management at maximum implementation, a rate of spotted owl population increase of 0.5 percent per year for managed area, and a decline of 5.3 percent per year for the unmanaged area. These population trend data are based on information from past studies (Section 3.4.1) and not on specific estimates of barred owl populations or dispersal distances. The Service has therefore used the best available information to analyze and disclose the effects of the alternatives, including Alternative 2.

Comment 30

One commenter stated that the DEIS cited no evidence to support an increase in spotted owl populations with the removal of barred owls and that there was no significant effect on spotted owl reproduction or recruitment.

Response 30

Several studies have identified positive changes in spotted owl population dynamics following barred owl removal. In all study areas, the survival of remaining spotted owls improved immediately after removal of barred owls, the first step in stabilizing and increasing populations (Diller et al 2016, p. 702; Wiens et al 2021, p. 5; and Higley et al. 2023, p. 10). In addition, these same studies and work in the Sierra Nevada found positive effects on recruitment to the population and/or recolonization of spotted owl sites (Diller et al. 2016, p. 702-3 and 705; Wiens et al. 2021, p. 5; Higley 2023, p. 10 and Figure 20, p. 36; and Hofstadter et al. 2022, p. 282) See Section 3.4.1 in the EIS for details on those cited studies.

Comment 31

One commenter suggested clarifying the expected status of northern spotted owl populations in each province and noted that the northern spotted owl may remain endangered under any of the alternatives.

Response 31

The Service provided an estimate of the potential result of spotted owl population change under each alternative, if fully implemented and maintained for 30 years in Section 3.4 to allow for comparison across the alternatives. As we note in that section, this estimate is intended for comparison, not for detailed spotted owl population estimates. In Section 3.4.2 we describe the spotted owl's naturally slow population growth. This, and the continuing presence of barred owls in the northern spotted owl range, will likely result in slow growth of spotted owl populations.

The proposed Strategy is designed to manage, not eliminate barred owls in the northern spotted owl range. This is a common situation with established invasive species. We applied the best available tools for managing barred owl populations in the proposed Strategy with the intent to maintain at least some spotted owl populations in the wild in each physiographic province to support Recovery Criterion 2 from the northern spotted owl recovery plan - viable spotted owl subpopulations in each province. Therefore, the proposed Strategy can contribute to the recovery of northern spotted owls, even if it does not result in full recovery within the 30-year analysis timeframe.

Comment 32

One commenter suggested the estimate of spotted owl population after 30 years of implementation in the Eastern Washington Cascades Physiographic Province should be lower because the estimate does not take into consideration the trend in habitat loss due to increasing incidents of wildfire within this province. The commenter noted that relationships between habitat and spotted owl population size are not linear, but stated that if they were, the population estimate for this province, after 30 years of implementation, should be 18 spotted owl pairs rather than the 23 we estimated.

Response 32

While it is very likely that some areas will burn in the Eastern Washington Cascades Physiographic Province over the next 30 years, it is difficult to project whether this would affect the estimated spotted owl population trajectory for Alternative 2. Under the alternative, barred owl management is limited to barred owl removal around spotted owl sites, and within 50 percent or less of the mapped GMAs, for a total of 23 percent of the province under barred owl management at any one time. The proposed Strategy recommends considering fire risk in the placement of FMAs within the GMAs, thereby somewhat reducing the risk of loss of these management areas to fire. As the commenter noted, relationships between habitat and population are not linear, and careful selection of FMAs could further weaken the relationship between habitat loss and population loss. Even assuming a direct relationship between the two, the estimate in the EIS is only 5 pairs different than the adjusted estimate.

Comment 33

Several commenters requested the Service consider potential effects to other wildlife species, resulting from stray shots. Individual commenters noted specific concerns with the use of untrained hunters and the potential for lead contamination.

Response 33

The protocol for removal, including the training requirements and approach to removal, was designed to substantially reduce or eliminate the potential for accidental killing of animals (Appendix 2). This protocol has been applied across multiple studies and the removal of over 4,500 barred owls with no accidental injury or death to non-target individuals. Thus, the Service estimated very limited potential for injury or death of non-target species. We have added additional information in Section 3.5.3. of the FEIS.

Under the proposed protocol, removal work is limited to individuals meeting the training and skill requirements described in the protocol, not untrained hunters, and use of lead shot is prohibited.

Comment 34

Several commenters specifically noted the sensitivity of marbled murrelet to loud noises at critical times of the day during the nesting season, and recommended limiting or prohibiting the discharge of shotguns near murrelet nesting habitat during the nesting seasons. Some recommended surveys of potential murrelet nesting habitat before any barred owl removal. Commenters also questioned the potential effect of noise to other species, noting that we did not provide any detail on other species. Commenters stated that many other animals could be negatively affected by these gunfire-related aspects of the proposed action and alternatives.

Response 34

The Service analyzed the potential disturbance of marbled murrelets in Section 5.3.5 of the DEIS. In response to the public comments, we modified the removal protocol to further reduce the potential for disturbance of nesting marbled murrelets (Appendix 2, section A2.2.1) in the Final Strategy and EIS. Murrelets initiate nesting over a long period and their nesting season overlaps the bulk of the season when barred owl removal can be effectively carried out. We could not eliminate all potential impacts and still manage barred owls.

The modifications include prohibiting the use of loud firearms within the range of the marbled murrelet during the times when they are likely to be most sensitive to the noise, namely, the two hours before and two hours after dawn during the marbled murrelet breeding season. This would reduce, though not eliminate, potential disturbance of marbled murrelets. This limitation should prevent disruption of murrelet courtship activities, murrelet incubation exchanges, and the majority of chick feedings, and will also allow for effective barred owl removal to take place within the marbled murrelet range.

Relative to the recommendation to require surveys in potential marbled murrelet habitat prior to barred owl removal, we note that murrelet surveys require eight or more visits spread across much of the murrelet nesting season. Therefore, requiring negative surveys before commencing

barred owl management in the murrelet range would not only be time-consuming and expensive, but would prevent barred owl removal from being effectively carried out.

The Service did anticipate and analyze the potential for disturbance in Section 3.5.3. One commenter provided an example of observed disturbance of nesting robins by fireworks, but we note that fireworks include both noise and intense flashes of light and typically occur over extended periods. As we noted in the DEIS, barred owl removal efforts would involve one to three shots, separated by a few minutes to days. Removal sites are typically separated by at least a half mile. Removal could occur two to three times over a season if the site is recolonized by barred owls, though these are typically separated by weeks or even months. There is limited specific information in the literature on the potential for the noise of a single or few shots to significantly disturb forest wildlife species, and specific information was not provided by the commenters. However, we provided some additional information on disturbance from noise with similar characteristics to Section 3.5.3 of the FEIS.

Comment 35

One commenter asked whether noise impacts to spotted owls from shotguns use was considered in designing the Strategy.

Response 35

The Service did consider potential effects to spotted owls from the removal effort, both positive and negative. As described in the EIS Section 3.4.5, spotted owls are not likely to abandon nests or young as a result of occasional and short duration noise, even at the level of a shotgun.

Comment 36

One commenter recommended including the ability to designate FMAs or Special Designated Areas for other species that are impacted by barred owls but outside the range of the northern and California spotted owls.

Response 36

While we understand that other species are affected by barred owl predation or competition, expanding the area addressed by the Strategy to address species other than spotted owls is outside the scope of this action. Within the range of the northern and California spotted owls, implementers of the strategy may consider other species in decisions on the placement of specific barred owl management activities (e.g., FMAs) as long as the primary focus is conservation of spotted owls.

Comment 37

One commenter questioned whether the removal of barred owls would create a void in the ecosystem based on the assumption that barred owls are part of the balance of the system. Another commenter suggested that the removal of barred owl could lead to an increase in rodent populations and potentially zoonotic diseases in the wildland/urban interface.

Response 37

The comment is built on the assumption that barred owls are an established part of the ecosystem in the West. Barred owls are an evolutionarily recent addition to the ecosystems in the West.

Their populations were identified in northern Washington about 40 years ago, and they spread south from there. In many areas, barred owl populations are still increasing, and the effects of this non-native predator are still developing. In fact, researchers have cautioned that barred owls have the potential to cause trophic cascades to our native ecosystems (i.e., indirect species interactions that originate with predators and spread downward through food webs). Trophic cascades can actually lead to negative effect on individual species and destabilization of food webs (Holm et al. 2016, entire).

Barred owls have been identified as a likely cause of the decline of western screech owls and given their generalist diet, are likely impacting many native species that did not evolve in the presence of this type of predation, as described in Section 3.5.

Specific to the concern that reducing barred owls could lead to an increase in rodent populations and potentially zoonotic diseases in the wildland/urban interface, the Service acknowledges that the removal of barred owls may allow native rodent populations to recover to pre-invasion levels. However, barred owls are only one rodent predator. Native predators, both avian and mammalian, may respond to this increase in available food supply and reduce some if this increase. Because barred owls are a recent introduction to wildland ecosystems in the West, we would expect their removal to result in an eventual return to conditions that were present before their arrival.

C**omment 38**

The commenter suggested the Service consider Washington Department of Natural Resource (WDNR) trust responsibilities and mandates and recommended exclusion of WDNR lands if in development of FMA to ensure agencies are able to manage timber resources in a manner consistent with agency mandates.

Response 38

The Service included WDNR managed lands within GMAs, and expanded these, at the request of the agency. The implementation of barred owl removal, through site management or the creation of FMAs, on WDNR managed lands would be a decision of WDNR. As noted in the EIS, inclusion in a GMA or Special Designated Area does not change the underlying management status of lands.

Comment 39

One commenter expressed concern that the DEIS acknowledges no limitation on the potential that timber harvest on Federal lands could increase from current levels as northern spotted owl populations rebound. The commenter interpreted our language as indicating, without any qualification, that timber harvest levels could increase if spotted owl populations increase.

Response 39

As we note in Section 3.8 of the EIS, it is possible that timber harvest could increase as spotted owl populations rebound, but this possibility is not without qualification. Timber harvest on Federal lands is subject to the requirements of section 7(a)(2) of the Endangered Species Act (ESA). If the Federal action may affect any threatened or endangered species, the Federal action agency consults with the Service (and/or the National Marine Fisheries Service) to evaluate the status of the species, the environmental baseline, the effects of the proposed action, and

cumulative effects as defined in the ESA. Impacts on individuals of a listed species, including any anticipated take, are part of the effects of the action considered in determining if an action is likely to jeopardize the continued existence of the listed species (that is, reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild).

If spotted owl populations rebound, each adverse effect to an individual spotted owl will become less consequential to the likelihood of survival and recovery at the range-wide scale, potentially providing greater flexibility to action agencies in conducting forest management. This may include greater flexibility to introduce short-term adverse effects via forest restoration intended to result in long-term benefits to spotted owls. However, unless and until spotted owls recover to the point that they no longer need the protections of the ESA, we will continue to evaluate Federal actions to determine whether they will jeopardize the species.

Additionally, if the proposed Federal action will affect designated critical habitat, the consultation includes an evaluation of effects to the critical habitat, including a determination as to whether the action will destroy or adversely modify critical habitat. Evaluations of effects to critical habitat are independent of the population health of the species, as long as it remains listed. If the Service determines that a Federal action is likely to jeopardize the species or destroy or adversely modify critical habitat, the Service works with the action agency to develop reasonable and prudent alternatives that meet the purpose of the action without jeopardizing the species or destroying or adversely modifying critical habitat.

Comment 40

One commenter suggested that barred owl management areas could become de-facto reserves and that this would have economic impacts on the economic health of western Oregon. They stated that the Strategy may have a direct economic effect on BLM by requiring that BLM to engage in a monitoring program resulting in fewer BLM funds being used for forest management. Another commenter expressed concern that the potential effect of the redistribution of funds by Federal partners from other resource management projects.

Response 40

As described in the EIS (Section 2.3) none of the action alternatives, including the proposed action, result in any change in current land use plans. The actions described can generally be applied in concert with existing land management.

Because of the voluntary nature of the Strategy, leaving decisions on the location and extent of barred owl management in the hands of the implementing landowners or land managers, the Service has provided a descriptive analysis of the potential socioeconomic effects in Section 3.8 of the DEIS. Determination of whether, to what extent, and where barred owl management would occur is entirely at the discretion of the individual entities as long as it is consistent with the terms and provisions described in the selected alternative and associated Record of Decision. The Service is not required to speculate on possible future actions of other agencies.

The commentor asserts that the proposed Strategy would have economic effects on western Oregon communities as a result of reduced timber harvest on BLM-administered lands. The proposed Strategy would not directly cause any reductions in timber harvest on BLM-administered lands. BLM participation in barred owl management is a feature of the existing

BLM resource management plans and that participation would not require any restrictions on timber harvest on BLM-administered lands. CEQ regulations limit the definition of effects to changes to the human environment that are both caused by the action and are reasonably foreseeable (40 CFR 1508.1(g)). The economic effects the commentors postulate would not be caused by the proposed Strategy and are not reasonably foreseeable, and thus do not require analysis in this EIS.

Potential changes to the BLM resource management plans such as those raised by the commentor are not required to implement the proposed Strategy. In fact, existing BLM resource management plans already commit to BLM participation in barred owl management when the Service determines the best manner in which barred owl management can contribute to the recovery of the northern spotted owl (BLM Northwestern and Coastal Oregon Resource Management Plan, p. 30, and BLM Southwestern Oregon Resource Management Plan, p. 30). Thus, any such speculative restrictions on timber harvest are not reasonably foreseeable and therefore do not require analysis under NEPA. Furthermore, any such speculative restrictions on timber harvest would not be caused by the Strategy and therefore do not require analysis in this EIS under NEPA.

The commentor also postulates that the proposed Strategy would have economic effects because it would cause the BLM to spend additional money on monitoring, and thereby spend less on forest management, harvest less timber, and have adverse economic effects on western Oregon communities. Such a tenuous causal chain cannot constitute a reasonably foreseeable effect under NEPA and thus does not require analysis. The BLM already committed in the resource management plans to develop and implement a monitoring program for barred owl management and anticipated providing funding for barred owl management (BLM Northwestern and Coastal Oregon Resource Management Plan, p. 30, and BLM Southwestern Oregon Resource Management Plan, p. 30). Thus, the BLM has long anticipated this monitoring in the context of implementing the entirety of the resource management plans: that is, continuing to implement timber harvest at the levels anticipated in the resource management plans and implementing monitoring of a barred owl monitoring program. Additionally, the commentor speculates without foundation that the BLM spending money on barred owl monitoring would reduce the money the BLM spends on forest management, which is not reasonably foreseeable and therefore does not require analysis under NEPA.

Comment 41

One commenter suggested specific edits to the Socioeconomics Section of the DEIS on page 158. The commenter agreed with language in the DEIS stating that increased northern spotted owl populations could increase flexibility to harvest timber and that with a healthier population, timber harvest would be less likely to jeopardize northern spotted owls. However, the commenter requested this section be revised to discuss the avoidance of adverse effects in addition to avoidance of incidental take and jeopardy. The commenter provided a specific example from a U.S. Forest Service project to illustrate these concerns.

Response 41

The commentor speculates on possible changes to Federal forest management which would have indirect socioeconomic effects. Such possible changes to Federal forest management would not be caused by this proposed action and are not reasonably foreseeable and therefore do not require

analysis under NEPA. Federal action agencies sometimes choose to avoid adverse effects to spotted owls as part of their project proposals, even when they are not required to do so to avoid jeopardy or incidental take under the Endangered Species Act. This is a choice made by action agency decision makers. In the example provided, it appears the action agency weighed the benefit of utilizing a programmatic consultation that set particular sideboards for effects of actions for a project to be considered under that programmatic consultation and chose that approach rather than undertaking a separate consultation for the project. This is the kind of choice within the action agency's discretion to determine the best approach for project implementation. While increases in spotted owl populations may change action agency decision makers' perceptions of the costs, risks, and benefits, we cannot predict how their perceptions and decisions may change, and this may vary by decision maker within and among action agencies. The Service is not required to speculate on possible future actions of other agencies.

Comment 42

Several commenters recommended that the EIS include an estimate of the cost of barred owl management under each alternative. Two commenters noted the difficulty of estimating costs involving multiple entities over 30 years, but suggested the Service provide projections for the cost associated with the Service's activities such as training, monitoring, and administrative costs.

Response 42

In Section 3.8.1.1 the Service provided a description of the factors that would affect the cost of implementation under this framework Strategy and the factors that affected the ability to estimate costs. Given the complexity of these factors, we did not attempt to estimate specific costs as this would not accurate and meaningful information to the public, entities seeking to implement barred owl management, or the decisionmaker. A general comparison of the level of work under each alternative can be inferred from the maximum total acres on which barred owl removal could occur under each alternative (see Table 2-7). The cost for the Service's activities is equally variable depending on the number of implementers, area under barred owl management, and the level of training required.

Comment 43

Several commenters noted that the EIS should consider how climate change may affect spotted owl habitat, survival, and recovery, including noting that climate change and forest wildfires have been putting pressure on northern spotted owls for decades, and will continue to do so with or without barred owl. Comments also noted that we acknowledge potential effects of climate change on barred owls and barred owl expansion.

Response 43

The Service considered climate change throughout the Strategy and EIS. In Section 3.9 of the EIS the Service considered the potential effects of climate change on environmental resources affected by the proposed action and alternatives, including spotted owls. We considered how climate change could affect each alternative and its environmental impacts, as well as the potential effects or contribution of the action alternatives to global climate change. Additional discussion of climate change can be found in Section 4 within cumulative effects. The Service has clarified the potential contribution of climate change on the movement of barred owls into

the West in the FEIS, but this did not change the Service's conclusion (See Appendix 1 in the FEIS for more details).

Comment 44

Several commenters suggested including additional information regarding Tribal consultation and collaboration on the management strategy and DEIS. This included a list of Tribes contacted.

Response 44

The Service reached out to all Tribes across Washington, Oregon, and California at the initiation of work on the development of the Strategy and at each step in the process. The Service provided information meetings and invited Tribes to participate in the development of the Strategy, the EIS, and to serve as cooperating agencies on the EIS. We conducted several individual discussions with Tribal staff and offered government to government consultation to all Tribes. A complete description of the outreach is provided in Section 3.10.3.

Comment 45

One commenter expressed concern that the potential effect of the redistribution of funds by Federal partners from other resource management projects.

Response 45

The commentor speculates on possible changes to funding for Federal resource management. Such possible changes to funding for Federal resource management would not be caused by this proposed action and are not reasonably foreseeable and therefore do not require analysis under NEPA. The Strategy provides a framework under which landowners and land managers may choose to implement barred owl management for the conservation of spotted owls. Implementation is voluntary, leaving decisions on the location and extent of barred owl management in the hands of the implementing landowners or land managers. The potential for funding of barred owl management is also at the discretion of the implementing agency. The Service cannot speculate on the level or source of funding that a Federal agency may choose to use for barred owl management or whether funding barred owl management would reduce other resource management efforts.

Comment 46

One commenter requested the Service acknowledge the ongoing contributions of the Washington State Department of Natural Resources (DNR) Habitat Conservation Plan (HCP) in providing Northern spotted owl habitat, regardless of barred owl removal.

Response 46

The Service acknowledged the Washington DNR HCP in Section 3.8 Socioeconomic effects and Section 4.1.3 within cumulative effects.

Comment 47

One commenter recommends the Service analyze the effects of not developing and implementing a barred owl control program, specifically on timber harvest on BLM managed lands subject to the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act. The comment

asserts that there will be significant socioeconomic impacts if, per the commenter's understanding of BLM's Resource Management Plans for Western Oregon, the BLM is required to halt all timber sale activity for years while reconsulting with the Service under section 7(a)(2).

Response 47

The Service notes the commenter's acknowledgment of the role of the Strategy in the BLM 2016 Resource Management Plans (RMPs). In those RMPs, the BLM committed to participation in a barred owl management when the Service determines the best manner in which barred owl management can contribute to the recovery of the northern spotted owl (BLM Northwestern and Coastal Oregon Resource Management Plan (BLM 2016a, p. 30) and BLM Southwestern Oregon Resource Management Plan (BLM 2016b, p. 30)).

The Service considered the effects of not implementing the Strategy on Federal forest lands as part of the No Action Alternative (Section 3.8.4). The Service acknowledged that without a barred owl control program it is reasonable to expect an increase in the need for protection of the remaining occupied spotted owl sites on Federally managed lands. The Service then disclosed that this would result in additional limitations on commercial timber harvest on those lands in and around occupied spotted owl sites, constraining timber harvest. The Service concluded that there would be a reduction in timber harvest levels as a result of declining spotted owl populations, but only until spotted owls are extirpated from a given harvest area. The commentor speculates on possible changes to Federal forest management which would have indirect socioeconomic effects. Such possible changes to Federal forest management would not be caused by this proposed action and are not reasonably foreseeable and therefore do not require analysis under NEPA.

The commenter's sense of urgency of implementing a barred owl management strategy only supports the Service's statement of the need for the action.

Comment 48

One commenter requests that the Service analyze habitat degradation under cumulative effects, providing additional information on the source of the estimate of habitat decline, and the number of annual take permits granted for northern spotted owls.

Response 48

The Service analyzed the cumulative effects of forest and forest management in Sections 4.1.1 through 4.1.3.

Incidental take permits are not issued annually, but are issued for actions covered by habitat conservation plans or safe harbor agreements (SHA) (now referred to as conservation benefit agreements (CBA)). The Service delineated and analyzed the effects of the past and reasonably foreseeable future incidental take permits or enhancement of survival permits issued pursuant to HCPs and SHAs/CBAs respectively in Sections 3.8, 4.1.3 and 4.1.4.

Comment 49

One commenter requested that the Service provide the documentation to support the contention that the carrying capacity of northern spotted owl habitat is declining by 5.3 percent.

Response 49

The actual statement in the EIS is "To estimate the northern spotted owl population trend in the absence of barred owl management we used the above starting populations and extrapolated the 5.3 percent annual population decline over the 30 years of the analysis based on the most recent population trend data from the spotted owl demography analysis (Franklin et al. 2021, entire)." The data is found in the Franklin et al. 2021 citation.

Comment 50

One commenter stated that the EIS did not describe or analyze the loss of barred owls to other sources, such as predators, contaminants, vehicles, wind turbines, or human activity and should analyze the cumulative effect of barred owl population depletion from all losses on the larger environment.

Response 50

There is little information on specific losses of barred owls to other causes listed by the commenter, particularly in the West. Studies of carcasses from experimental barred owl removal have detected anticoagulant rodenticide in barred owls but have not demonstrated impacts to survival or reproduction of the barred owls.

Barred owl populations in the West continue to expand and increase in density in the southern portions of the range. Barred owl populations in the northern portion (Washington and northern Oregon) may have reached carrying capacity in some areas. Therefore, while other losses may be occurring, these individual losses are not depleting barred owl populations in the West.

The EIS does discuss implications of the intentional removal of barred owls on other species, including potential prey or competing native predators. As discussed in Section 3.5, the species beneficially affected by each action alternative would vary due to differences in the location of barred owl management.

A6.1.4 DEIS Comments - Monitoring

Comment 51

A number of commenters requested additional details regarding the monitoring plan for the Strategy, including how we will measure success. Many of these commenters suggested that we provide an adaptive management plan that would specify how monitoring information would influence further management, including criteria that would trigger revision or discontinuation of the Strategy.

Response 51

Our monitoring plan focuses on the information required to assess whether actions implemented under the Strategy are consistent with the Strategy as written (implementation monitoring) and how barred and spotted owl populations are responding to management conducted under the Strategy (effectiveness monitoring). With respect to effectiveness monitoring, we chose to provide a flexible framework that allows implementers to submit data collected using various methods, provided that the data would be informative regarding the key questions identified in the monitoring plan (whether there are fewer barred owls in managed areas, continued northern spotted owl presence at managed sites, stabilizing northern spotted owl populations in block

management areas, lack of barred owl population establishment in the California spotted owl range). We made this choice in order to minimize monitoring-related barriers to participation in the Strategy. The Recovery Plan gives measures of success with respect to the conservation of northern spotted owls range wide, and although we do not expect that barred owl management alone will be enough to achieve the recovery criteria, it will be necessary to move northern spotted owl toward recovery. Likewise, if the Service lists the California spotted owl under the ESA as proposed, the Service will develop recovery criteria for each of the two California spotted owl populations. Increasing the specificity of our monitoring requirements would likely increase monitoring-related barriers to participation. We are not required to include an adaptive management plan as a component of monitoring, although we agree that adaptive management can be very useful in improving management decisions over time. Our monitoring plan includes annual assessments and an in-depth analysis of monitoring data every five years. Even without an express adaptive management plan, this provides opportunities to learn from monitoring data and is sufficiently well developed and described in the EIS.

Comment 52

One commenter recommended the use of acoustic technology for monitoring spotted owls as this is less intrusive. Another commenter suggested we provide a cost-benefit analysis of passive acoustic monitoring vs. traditional methods using seasonal field crews to monitor spotted and barred owls.

Response 52

As described in the EIS (Section 2.3.2 and Appendix 4) we encourage implementers to use automated recording units for monitoring but will accept other methods that provide the same level of information to accommodate the information sources available and the needs of various landowners and land managers. We do not provide a cost-benefit analysis of each potential monitoring method, as the costs and benefits are likely to vary widely depending on an implementer's current business practices, various landscape features of the area to be monitored, and other factors.

A6.2 Comments Primarily on the Proposed Barred Owl Management Strategy

Comment 53

One commenter recommended including USDA Wildlife Service's National Wildlife Research Center in future development of the barred owl management strategy for technical advice.

Response 53

We used data from experts at the National Wildlife Research Center, including Franklin et al. 2021, in the development of the Strategy. In addition, individuals involved in the Franklin et al. meta-analysis served on the Strategy development team.

Comment 54

One commenter requested that the Service provide more specifics on requirements for approving barred owl removal under the Service's permit, including minimum areas and time commitment,

pre-removal monitoring, minimum habitat conditions, and goals for barred and spotted owl populations.

Response 54

Major differences in barred owl populations, spotted owl populations, topography, ownership, forest conditions, access, and many other factors occur within and across the range of the northern spotted owls and would affect the efficacy of barred owl removal efforts. For example, in Marin and Sonoma Counties, removal for one or two years on a single barred owl site followed by monitoring would provide significant conservation whereas in densely populated areas such as the Oregon coast ranges, the same level of work would not. Rather than set standards that might prevent effective barred owl management in some areas, the Service will work with interested landowners or land managers to develop barred owl management that can be effectively implemented and contribute to the conservation of spotted owls. Additional detail about requirements for approving barred owl removal under the Service's permit is not necessary to analyze the significant effects of the alternatives under NEPA. If the Service adopts a barred owl management strategy, additional detail would be provided in the MBTA permit.

Comment 55

Several commenters expressed concern that barred owl removal will need to continue long term because barred owls will not be eliminated and will continue to recolonize areas after removal. They noted that while the 30-year timeline makes sense for the purposes of analysis, the commenters suggested that the Service provide its best accounting of the overall time frame over which lethal control activities will need to continue. Two commenters expressed concern that there was no potential endpoint and removal would be required indefinitely. One commenter wondered whether the Strategy represented a stopgap effort to buy time for research on other methods to support conservation of spotted owls in relationship to barred owl competition.

Response 55

The Strategy does not attempt to, or anticipate, completely eliminating barred owls from the range of the northern spotted owls. As commenters have noted, once barred owl populations are established in an area, elimination is highly unlikely. This is the nature of invasive species in general.

The most effective and economical method for managing invasive species is early detection and rapid response, thereby preventing the invasive species from becoming established. This is the approach proposed for the range of the California spotted owl where barred owl populations are not fully established. However, even this approach requires long term monitoring and continual action, albeit at a less intense level.

In the range of the northern spotted owl, early detection and rapid response is no longer an option. Once invasive species populations become established, management shifts focus to control and management. In our situation, the only tool for such management that has been demonstrated as effective is removal of barred owls. We discuss the alternatives for such removal in Sections 2.3.1 and 2.10 of the EIS. For northern spotted owls, the Strategy focused on maintaining spotted owls in selected treatment areas across the range of the species, creating refugia for the spotted owl's survival.

Given the extent of barred owl populations in the range of the northern spotted owl, it is likely that some form of active management will be required for an extended time. As noted in Gobel et al. (2012), "The threats that most species face cannot be eliminated, only managed." The northern spotted owl fits the definition of a "conservation reliant species", requiring species-specific management strategies. Therefore, long term barred owl management will likely be needed to provide for the survival and recovery of the spotted owl. However, whether such management will require lethal removal of barred owls in perpetuity is not known. Broad-scale research on invasive species management techniques is ongoing and other tools may be developed that can be applied to this situation.

Comment 56

One commenter suggested that the Service require those interested in implementing the Strategy under the Service's MBTA permit commit to sustaining lethal control activities for an extended period of time, preferably 30 years.

Response 56

Requiring long term commitment from interested land managers or landowners prior to allowing operations would greatly reduce the potential for such implementation. For example, Federal and State agencies operate on annual or biannual budgets and cannot guarantee specific funding actions over long periods. That does not reduce their commitment. In some areas, such as the California spotted owl range, and Marin and Sonoma Counties, short term removal may provide significant conservation by limiting the establishment of breeding barred owl pairs. In addition, some of the elements of the Strategy, such as spotted owl site management, may not require long-term commitments to provide conservation value. However, removal for only one or two years in areas with dense barred owl populations though providing immediate relief to impacted spotted owls would provide less long-term conservation benefit. The Service will work with interested parties to address an appropriate level of commitment to the proposed barred owl management prior to designating them to operate under the Service's MBTA permit.

Comment 57

One commenter suggested that all currently occupied northern spotted owl sites, and historically occupied spotted owl sites on public land, should be assigned priority A.

Response 57

Under Alternative 2, barred owl management within and around all currently occupied spotted owl sites is a priority A option across all physiographic provinces. The management priority for historically occupied sites without recent occupancy varies across the physiographic provinces as described in Appendix 4 of the Strategy. Prioritization is provided to help landowners or land managers focus their efforts but does not prevent barred owl management within and around any spotted owl site. Therefore, this suggestion is already fully analyzed as a component of Alternative 2.

Comment 58

Several commenters provided recommendations regarding prioritizations among provinces within the northern spotted owl range (as opposed to prioritizations among mapped barred owl management areas within each province). These suggestions included emphasizing the Washington East and West Cascades, due to the higher risk of extirpation in these provinces; avoiding barred owl management in Washington, and especially the Olympic Peninsula, due to the reduced chance of success; managing barred owls only within the California Coast and California Cascades province (as well as the California spotted owl range) due to a greater chance of success; and focusing more on areas where the invasion is not as established, as in Alternative 6, but still doing some level of barred owl management throughout the range.

Response 58

Several of the recommendations are substantially similar to alternatives analyzed in detail. Most of these are similar to Alternative 6 for the northern spotted owl, including avoiding barred owl management in Washington, barred owl management limited to California for northern spotted owl, and focusing on areas where barred owls are not fully established. The recommendation to do full barred owl management in the California spotted owl range is covered in Alternative 2 for California spotted owl. The recommendation to focus on Washington Cascades is substantially similar to Alternative 5. These recommendations represent minor modifications to the existing alternatives and are within the spectrum of the alternatives analyzed in detail.

Comment 59

One commenter recommended prioritizing barred owl removal in areas in the eastern portions of the East Cascades physiographic provinces over areas in the western portions of these provinces, based on work by Larry Irwin and others showing that spotted owl sites located in the drier, eastern portion of the Washington East Cascades had higher fecundity than those within wetter, high elevation areas.

Response 59

We are aware of the study discussed by the commenter (Irwin et al. 2004), and although it was not explicitly cited in the Strategy or EIS, its results did influence the discussion of FMA prioritization in the Washington East Cascades. We have included this reference in the final Strategy, Section A4.3

A6.2.1 Strategy Comments - GMA and FMA

Comment 60

One commenter recommended including areas containing suitable habitat south of the Mount Hood West GMA in a mapped barred owl management area.

Response 60

We reviewed this suggestion and determined that inclusion of the area in question within the Mount Hood West GMA would be more consistent with our approach to GMA mapping in other portions of the northern spotted owl range. Therefore, we include this area in the Mount Hood West GMA for Alternative 2 the FEIS and updated proposed Strategy.

Comment 61

One commenter noted that Lake Chelan National Recreation Area and adjacent areas of the Okanogan-Wenatchee National Forests are not included in any of the GMAs, and suggested that this area be included, due to the recent documented presence of northern spotted owls at a site in the lower Stehekin Valley.

Response 61

We reviewed the area in question, a discrete patch of habitat along valley bottoms embedded within steep terrain and determined that site management recommendations would allow for barred owl removal within most or all of the spotted owl habitat in the area. Therefore, there would be no clear benefit of adding the area to a mapped barred owl management area. We have highlighted this area in our site management recommendations for the Washington East Cascades province as an illustration of how site management could be used in the proposed Strategy. In the Washington East Cascades, the Strategy would assign priority A to site management of the Stehekin Valley site, which has been active within the last five years, and would encourage barred owl removal within an area of up to approximately 58,630 acres. Site management at neighboring historical, but currently unoccupied, sites would also be allowed under the strategy, which could result in barred owl management of all or nearly all of the contiguous habitat in this area.

Comment 62

One commenter suggested the Service consider wilderness areas, land allocations with limited timber harvest objectives, and current and planned vegetation management projects when considering the boundaries of GMAs and the placement of FMAs.

Response 62

The placement of GMA and Special Designated Area boundaries was based on a variety of considerations, including the presence of reserved lands. These reserved lands include not only Congressionally-withdrawn wilderness areas and National Parks, but also administratively withdrawn lands and land use plan allocations such as Federal Late Successional Reserves. In Appendix 4 of the Strategy the Service recommends that implementers developing the boundaries of FMAs consider the presence of reserved lands. Barred owl management in designated Wilderness areas can be somewhat problematic because of limited access. However, in many places we did include wilderness within GMAs where this was practical or where access points existed. As the commenter noted, some wilderness areas are high elevation and lack spotted owl habitat. Other areas are inaccessible. In Appendix 4 of the Strategy, we have clarified our reasons for the placement of GMA boundaries. The Service considered the recommendation to include more wilderness in the boundaries of GMAs. Our revised barred owl management area boundaries included additional wilderness in the following management areas: Mount Hood West, South Oregon West Cascades, South Oregon East Cascades, and Central California Coast GMAs, and Central California Cascades Management Zone.

Comment 63

One commenter noted that the 15-mile buffer of Alternative 3 provided for removal of barred owls from dense populations in the Puget Sound lowlands and recommended this be included in

the final action. They noted this area would be a source of barred owls to recolonize nearby areas.

Response 63

The recommended inclusion of the 15-mile buffer is fully analyzed in the EIS as a component of Alternative 3. The Western Washington Lowlands Physiographic Province (See Map 2.1 in the FEIS) includes the Puget Sound lowland area described by the commenter. This area was excluded from the mapping of GMAs or other Special Designated Areas due to the very limited spotted owl habitat and lack of recently occupied spotted owl sites. As the commenter noted, this area does provide habitat for barred owls and would likely provide dispersing barred owls that could recolonize some barred owl management areas in the Olympic Peninsula and Western Washington Cascades provinces. However, this is not the only source of barred owls for such recolonization. Barred owls will be produced in areas within these provinces that are not under barred owl management, including inaccessible areas and areas around human habitation. Under Alternative 2, barred owl management would not occur on the entirety of the mapped areas. Alternative 2 does not attempt to completely remove barred owls for these areas or expect to prevent all recolonization.

Comment 64

One commenter noted that spotted owls are less likely to respond to surveys in areas with dense barred owl populations, and therefore the value of spotted owl habitat should not be discounted in the absence of spotted owl survey data.

Response 64

In developing the Strategy, including the GMAs and Special Designated Areas, the Service considered all information available, including GIS models of spotted owl habitat and information from spotted owl surveys that have been done over the years. Both of these information sources influenced our placement of the boundaries of these areas, as well as the prioritization of each area. Barred owl removal will be more effective for spotted owl conservation if it can be done in the vicinity of existing spotted owls. Where survey information is current, implementation will be more efficient and can be accomplished more quickly. In areas where surveys are not available, implementers will either need to conduct spotted owl surveys prior to determining where to remove barred owls, or risk placing barred owl management areas in locations where they will be less effective for spotted owl conservation. While survey status and current spotted owl presence were factors considered in prioritization, they were not the only factors. We clarified the rationale for the prioritization of each individual mapped area in Appendix 4 of the Strategy.

Comment 65

Several commenters noted the need for more northern spotted owl surveys in many parts of the range, and suggested including survey recommendations as part of the Strategy.

Response 65

We agree that there are many parts of the northern spotted owl range where additional surveys would be valuable for selecting barred owl removal areas that can provide the greatest benefit to spotted owl populations. While the initial draft Strategy did include recommendations for

additional survey effort, we have made these recommendations more prominent and clearer in the revised proposed Strategy.

Comment 66

Five commenters provided recommendations for changes to the priority of GMAs and Special Designated Areas in Washington and the northern portion of the Oregon Cascades.

Response 66

The Service reviewed all the recommendations concerning the prioritization of individual GMAs and other Special Designated Areas provided by commenters. The Yakama Nation lands were added to the South Washington East Cascades GMA after the initial prioritization was completed for the DEIS in Alternative 2. The team reviewed the priority level with the inclusion of these lands and revised the priority for this GMA. We have updated and clarified the rationale concerning the prioritization of each GMA and Special Designated Area in Appendix 4 of the Strategy. We have also clarified the intended use of our prioritization recommendations.

Comment 67

One commenter raised concerns over the removal of barred owls in Marin and Sonoma Counties because there were few barred owls in the area and spotted owl populations were stable. Another noted that while this is true, the reason the barred owl population is not increasing in Marin County may be due to the removal of some barred owls under a scientific permit and this may demonstrate the effectiveness of barred owl removal. Several commenters recommended prioritizing barred owl removal in Marin and Sonoma County because northern spotted owl populations are relatively stable and barred owl presence is fairly low. Eliminating barred owls or maintaining their populations at very low level, would maintain this important population. One commenter recommends that under the Proposed Action (Alternative 2), Marin County be reclassified from prioritization system Priority B to Priority A.

Response 67

The low number of barred owls in Marin and Sonoma Counties is a result of this area being the farthest from the initial invasion source and barred owl research collections in 2015 and 2021. Prior to the 2021 experimental removals, barred owls were on the cusp of potential accelerating growth in these two counties. At that time, spotted owls were displaced from some territories. At this time, barred owl populations are low, leading us to place high priority on management to maintain low barred owl populations in Marin and Sonoma Counties. However, it was incorrectly listed as priority B in Table 5, and should have been priority A. We have corrected this error.

Comment 68

One commenter suggested the Service prioritize placement of FMAs in areas already designated for management that would not conflict with future timber management or active forest management. This could include areas allocated to Late Successional Reserves and other reserve areas described in Federal land management plans, Congressionally-designated areas such as wilderness areas, and designated northern spotted owl critical habitat. They also recommended the Service avoid placement of FMAs that would complicate the implementation of active and planned vegetation management projects with a timber harvest component.

Response 68

Appendix 4 includes recommendations for the placement of FMAs and other management areas for each mapped area (e.g., GMAs, Special Designated Areas). The recommendations for the placement of FMAs by implementers includes areas already designated for spotted owl conservation, recovery, or management. These recommendations include all of the areas described by the commenter. Federal and State land managers will be part of any decision to establish FMAs on Federal or State lands. Possible changes to Federal or State forest management would not be caused by placement of FMAs or any other component of this proposed action and are not reasonably foreseeable and therefore do not require analysis under NEPA.

Comment 69

One commenter suggested that prudent placement of FMAs is a critical component of the Strategy, and this placement should be a function of long-term viability of those FMAs based on habitat availability, land use designation, and land ownership, and not based on proximity to existing northern spotted owl sites that would allow easy recolonization.

Response 69

Appendix 4 of the Strategy contains recommendations for the placement of FMAs in each of the GMAs, including the elements suggested by the commenter. However, in the immediate term, for the purpose of protecting the remaining spotted owls, particularly in areas where populations have declined precipitously, management of barred owls around these sites is a high priority. The presence of extant spotted owls is important for recolonization of FMAs as barred owl populations are reduced. Maintaining current spotted owl sites in or near FMAs increases the potential for natural recolonization. Maintaining recent and active spotted owl sites in other portions of the province maintains a source for potential future augmentation, such as relocation, should such augmentation become necessary.

A6.2.2 Strategy Comments - Ethical Issues

Comment 70

Several comments expressed general concern over the ethics of killing barred owls. One was concerned that this action could normalize killing of owls. Two expressed concern that this could lead to increased poaching of spotted owls. Two commenters were concerned that the action could affect the public's respect for bird protection laws. One commenter noted the difficult ethical decision between killing a species and the need to act to prevent extinction of a species. One commenter stated that removing protections from the barred owl will encourage habitat encroachment.

Response 70

The Service takes ethical concerns very seriously. Following completion of the Northern Spotted Owl Recovery plan in 2008, the Service convened a Barred Owl Stakeholder Group to ensure that we considered values and ethics in implementation of recovery actions specific to barred owl management (Recovery Actions 29 and 30). The Service discussed the results of the group's deliberations and additional comments (USFWS 2013 EIS Section 3.6.2). We fully acknowledge

that killing barred owls is difficult for some people to contemplate. We agree with the commenter who noted the difficulty of the decision to kill individuals of a common species, even to prevent the extinction of another species.

Some commenters focused on the potential for this action to change public opinion or actions relative to poaching and respect for bird protection laws. The Service, in the Strategy and EIS, have presented a measured rationale for the reasons for, and need to, reduce invasive barred owl populations to prevent extinction of a native species. We have also limited removal to specially trained professionals and where we have landowner or land manager commitment. We cannot speculate on the personal decisions of individuals, but note that nothing in the Strategy or its implementation changes any of the existing laws, or the legal consequences for individuals who may choose to violate them. Commenters provide no basis for their speculation about the proposed action causing future illegal killing of owls; any such future illegal action would not be caused by the action and is not reasonably foreseeable and does not require analysis under NEPA.

Nevertheless, commenters' concerns over ethics and the "public's respect" do not point to any deficiency in the EIS related to compliance with NEPA. The ethical concerns presented by commenters and speculative characterization of the "public's respect" lack that reasonably close causal relationship with a change in the physical environment and do not require analysis under NEPA.

Comment 71

One commenter recommended the EIS acknowledge that this Strategy would be implemented at the expense of the barred owl.

Response 71

The EIS analyzes the effect of the alternatives on barred owls (see Section 3.3). The results clearly describe how the action would be implemented at the expense of barred owls, which is consistent with, and necessary to meet the purpose and need for the action.

Comment 72

One commenter stated that the Service did not fully analyze the ethical consequences of the proposed lethal removal specifically noting a lack of consideration of the individual animals and their viewpoint.

Response 72

The Service is obligated under NEPA to consider the environmental impacts of their actions in the decision-making process (40 CFR 1502.1). The purpose and function of NEPA is satisfied if Federal agencies have considered relevant environmental information, and the public has been informed regarding the decision-making process (40 CFR 1500.1(a)). The EIS analyzes in detail the effect of the action on barred owls (Section 3.3); the action necessarily includes the lethal removal of individual barred owls (Sections 1.3, 2.10.4). The Service has no basis on which to analyze the effects of the action on the viewpoints of those individual animals other than to acknowledge that they would be killed. Regardless, the effect of the action on individual

animal’s viewpoint lacks a reasonably close causal relationship with a change in the physical environment and does not require analysis under NEPA.

Comment 73

One commenter suggested that the Service create an ethics committee to oversee effects to the ecosystem and address the potential biological effects of loss of a pivotal predator that has created a niche since the early 1900s, as well as the potential ethical issues.

Response 73

As described in response to Comment 70, the Service seriously considered ethical issues around the lethal removal of barred owls, starting during the development of the Barred Owl Removal Experiment (Experiment) in 2013 and again in the development of the draft Strategy. As part of the Service’s development of the Experiment, a broad stakeholder group was convened to consider the range of considerations around barred owl removal. We do not believe an oversight committee or "expert witness" is necessary to ensure consideration of ethical issues in implementation of the Strategy.

The Service notes that barred owls have not been a part of the Western ecosystems since the early 1900s, as described by the commenter. The first detections in the Western US were in the 1970s and the first self-sustaining populations were identified in the 1980s in the far north of Washington (EIS Section 1 and Appendix 1). Barred owls have continued to spread southward over the last four decades, recently reaching the southern portion of the northern spotted owl range.

A6.2.3 Strategy Comments - Invasive Species

Comment 74

Several commenters disagreed with the concept of invasive species in general, noting that species move with and without human assistance and have done so since the beginning of life.

Response 74

The Service addressed invasive species according to the directives and definitions of Executive Order 13751 (Safeguarding the Nation From the Impacts of Invasive Species) (88 FR 88609 (Dec. 8, 2016)). The concept of invasive species is widely accepted by governmental agencies and resource management professionals, though the specific definitions vary in some minor details. The commenter did not provide any specific information relative to the designation of barred owls as invasive.

Comment 75

One commenter stated that we developed our analysis of invasive status for the barred owl based on E.O. 13112 but should have used E.O. 13751 which amended it, though they noted that the definitions did not change.

Response 75

We have updated our analysis to incorporate the latest Executive Order related to Federal invasive species. E.O.13751.

Comment 76

Several commenters noted that characterizing the barred owl as an invasive was not necessary for initiating barred owl management for the conservation of spotted owls.

Response 76

We concur. We did not evaluate the status of barred owls under E.O. 13122, as amended by its successor E.O. 13751, as a prerequisite for the Strategy or barred owl management. Appendix 1 grew out of the early background analysis of barred owls in the West. However, Appendix 1 supports the characterization of barred owls as invasive according to the definition in the Federal direction represented by E.O. 13751 and represents our conclusion.

Comment 77

One commenter stated that the most likely explanation for indirect introduction is climate change affecting the southern portion of the boreal forest.

Response 77

The Service considered all mechanisms for the expansion of the barred owl's species range from eastern North America to the West, including climate change. We have clarified and expanded our discussion of the potential that climate change allowed movement of barred owls (Appendix 1).

Comment 78

One commenter stated that local Canadian research and species accounts consistently conclude that barred owls are spreading naturally and deserve a degree of habitat protection, citing Houston & McGowan 1999, Takats 1998, and Mazur et al 1998.

Response 78

The Service has reviewed citations provided by the commenter. Houston and McGowan (1999) provide an extensive discussion of documented barred owls across Canada. However, they do not suggest that these movements are "natural" or that habitat should be protected as the commenter suggested. Takats (1998) studied barred owls in the Foothills Model Forest in Alberta. He suggests that barred owls, as an older forest dependent species, can be used as an indicator and provides habitat protection recommendations, but does not address whether barred owls spread to Alberta naturally. Mazur et al. (1998) noted that the presence of barred owls in the central Saskatchewan was believed to be the result of a range expansion within the past 100 years but did not provide any comment on the cause or nature of this expansion. The research cited by the commenter do not provide documentation that altered our conclusions in Appendix 2.

Comment 79

Two commenters noted that the map of the barred owl range does not include the Great Plains and this absence proves that this was not the invasion pathway. They reasoned that if this were the pathway, there would be a greater presence.

Response 79

Map 2 in the Strategy shows the current range of the barred owl based on the best available information. However, this is the current condition, not the conditions around 1900 when the barred owl expansion began. Appendix 1 describes the changing conditions on the Great Plains in the U.S. and Canada that may have provided potential invasion routes. However, changes on the Great Plains did not stop at 1900. Over time farms consolidated, towns disappeared as travel became easier, trees planted for tree claims died, and rivers were extensively dammed resulting in a loss of riparian forest in some areas. Thus, the current range map does not necessarily eliminate the Great Plains as a potential invasion route.

Comment 80

Several commenters stated that barred owls were native, and therefore not alien (non-native) based on the fact that they are native to North America. One commenter specifically stated that species commonly considered "invasive" are those that were brought to the U.S. from other continents.

Response 80

E.O. 13751 defines native in terms of particular ecosystems, not continents. Many recognized invasive animal species are native to one portion of a continent, including North America. For example, bull frogs are native in the East and invasive in the West; northern pike are native in Alaska, portions of Canada, and the interior northern United States, but invasive in the West and South. Therefore, a native species in one part of North America may be non-native in other ecosystems.

Comment 81

Several commenters considered the barred owl native because they interpreted their presence in the West as a "natural" range expansion and not an introduction.

Response 81

E.O. 13751 includes the concept of "introduction" in defining species as native or non-native. Introduction is described as intentional and unintentional escape, release, dissemination, or placement into an ecosystem as a result of human activity. There is no evidence that barred owls were physically moved and released into the West by humans. Nor is there any evidence that they were brought as cage animals or pets and escaped. However, the preponderance of the evidence points to the potential that anthropogenic changes to central North America, the area that separated these species, allowed for this range expansion. This includes climate change, itself an anthropogenic change.

Comment 82

One commenter stated that barred owls were migratory, and thus not invasive.

Response 82

Biologically, migration is generally applied to movements of individuals or populations between breeding and non-breeding habitat or home ranges. This may occur annually as in waterfowl, songbirds, and caribou or over multiple years as with Pacific salmon that spend 2 to 4 years at sea before returning to spawning grounds. Migration may even be multi-generational as with

monarch butterflies. Most of these represent round-trip movements between seasonal habitats (Dingle and Drake 2007 entire).

The presence of a species on the MBTA list does not mean that the species actually migrates. This list includes species shared by nations, even when they do not make regular migratory movements. Barred owls engage in postnatal dispersal, leaving their birth area and ranging in search of a territory. They may wander for multiple years before securing a territory. However, once they settle on a territory, they have strong site and mate fidelity (Hamer et al. 2007 p. 256-259). Therefore, barred owls are not migratory in this sense.

The commenter did not explain why being migratory would prevent a species from being an invasive species but alluded to the potential range expansion as a "migration". If animals moved regularly between two or more areas, they would not be considered non-native in any of these habitats. Even if we consider the unidirectional and permanent range expansion of barred owls as "migration", this would not prevent them from meeting the definition of invasive.

Comment 83

Four commenters recommended that the Service consider the potential that climate change assisted in the range expansion of barred owls.

Response 83

The Service noted that climate change was one of the factors that may have allowed barred owls to move along the southern edge of the northern boreal forest (Appendix 1, Section A1.2.1).

Comment 84

One commenter stated that barred owls are not a risk to other species based on the fact that salamanders and screech owls, thought to be at risk from barred owl predation and competition in the West, coexist with barred owls in the east.

Response 84

Salamanders and screech owls in the East have evolved in an ecosystem in which the barred owl is both present and native, and have been so for a very long time. By contrast, western screech owls and native western salamanders have not evolved with this intense predation by an owl. Acker (2012, pp. 134-136) detected significant declines in western screech owls with the colonization of Bainbridge Island by barred owls. Because the Service accurately characterized the barred owl as a risk to other species, including the northern spotted owl, no revisions to the EIS are required in response to this comment.

Comment 85

One commenter stated that barred owls did not cause the spotted owl to become imperiled but are simply occupying new habitat created by humans.

Response 85

Barred owl competition was identified as a primary threat to the spotted owl in the Revised Recovery Plan for the Northern Spotted Owl and a potential threat to California spotted owls in the recent listing proposal. These conclusions are based on research and analysis over the past

two decades. The evidence that barred owls are displacing spotted owl, even in undisturbed older forests, demonstrates that barred owls are imperiling spotted owls and this is not limited to newly created habitat.

Comment 86

One commenter stated that barred owls compete for food and habitat but do not directly kill spotted owls and therefore do not harm spotted owls. Another commenter stated that if barred owls were truly harmful, we would be seeing the effects now.

Response 86

The definition of invasive species in E.O. 13751 does not limit harm to direct predation. Several studies and analyses of data have demonstrated clearly that barred owls are severely impacting spotted owl populations. A study on Bainbridge Island found that barred owls have substantially reduced western screech owl populations. This and additional information can be found in Section 5 of the Strategy and Sections 3.4.1 and 3.5.2 of the FEIS.

Comment 87

One commenter suggested that hybridization and competition between spotted owls and barred owls fails to reach the level of harm associated with invasive species definition.

Response 87

Hybridization is uncommon and has not been identified as a primary cause of harm to spotted owls. Competition for territories is the primary mechanism for barred owl impacts to spotted owls. Barred owls exclude spotted owls from territories and habitat, forcing spotted owls into suboptimal habitat and eventual death. Competition for prey may also occur and hasten the demise of the displaced spotted owls.

Comment 88

One commenter opined that the range expansion of barred owl should not lead to the killing of this species protected under the MBTA, noting that doing so sets a precedent for other species management.

Response 88

The Service specifically noted at the beginning of its analysis in Appendix 1 that the "following analysis is specific to the appropriate characterization for the barred owl in the West, specifically within the ranges of the northern and California spotted owls. It should not be considered a policy decision or applied directly to other species or situations, as each situation is unique." Even if a species meets the definition of non-native, it may be invasive in one area but not another. For a species to meet the definition of invasive, it must be likely to or actually causing economic or environmental harm or harm to human health.

Comment 89

One commenter expressed concerns with the designation of a jurisdictional MBTA species as invasive in a project EIS could have policy implications that should be considered at the Service

Director level or above. Service policy on MBTA species is set at the national office level because of the international treaty obligations and implications.

Response 89

The MBTA allows for the issuance of permits to take species covered by the MBTA in various situations. The characterization of the species as invasive in specific areas, such as in this case, does not change the status of the species under the MBTA and associated treaties. This is a limited but not unique situation, and does not establish a precedent, in that each situation will be evaluated in its particular context. For example, barn owls, a species protected by the MBTA, were introduced into Hawai'i, and became a threat to native birds. The Service issued a rule allowing agencies to take this species. The Service's final decision regarding the Strategy and the issuance of an MBTA permit will be coordinated appropriately internally.

A6.2.4 Strategy Comments - Barred Owl Removal Protocol

Comment 90

Several commenters recommended that elements of the removal protocol be clearly stated as required and that all removal specialists must adhere to all components of the protocol.

Response 90

We clarified the elements of the removal protocol to ensure compliance with all requirements and components of the protocol.

Comment 91

One commenter recommended that the Service require removal specialists to demonstrate proof of license or permit for the possession and use of the firearms.

Response 91

The removal protocol specifically states that "Removal specialists are responsible for obtaining all applicable State and Federal licenses and permits necessary for possession and use of firearms, and for their transport to and from the study area. Removal specialists are responsible for meeting all safety and operational requirements pertaining to those permits." Operating under the Service permit does not supersede these requirements and individuals would be liable for violations. The Service will be approving all removal specialists designated to work under the Service's permit. Anyone found to be violating these or any other standards may have their designation to operate under the Service permit revoked. Therefore, we have not added the requirement to provide proof of license or permit for possession and use of the firearms.

Comment 92

Several commenters noted that removal of barred owls during the breeding season has the potential to orphan young if removal occurs after young hatch and before they are independent. Most of these commenters recommended pausing removal during this period. One commenter noted that such a postponement would cause increased mortality of the barred owl's prey and further impacts to spotted owls and recommended removing entire families to reduce this impact.

Response 92

The Service acknowledges that removal of nesting barred owls during the breeding season may lead to the death of some orphaned young. However, failure to remove barred owls during the breeding season would greatly reduce the ability of spotted owls to survive, recolonize cleared sites, and reproduce. We have attempted to balance the adverse impacts to barred owls and the need for effective removal by adding recommendations to minimize the number of barred owl young that may become orphaned.

We have updated the protocol to recommend focusing initial removal in the fall and intensely in the early breeding season, before barred owl eggs are likely to hatch in the area, where practicable. This is particularly important and effective in the first year or two of removal in an area. During the initial years, most of the barred owls removed are territorial adults, and are likely to be breeding. Once barred owl populations are reduced in an area, subadults are the primary recolonizers and are less likely to breed in their first year due to age or difficulty in attracting a partner and reducing the number of young potentially orphaned. Continuing removal can limit the establishment of breeding pairs of barred owls. We also allow for the removal of young that can be positively identified as barred owls. This allows for removal of young and adults when they are located together and avoid orphaning.

Fall removal is valuable, but cleared sites may become reoccupied by barred owls before the breeding season, particularly in areas with well-established barred owl populations. Removal of barred owls before and during the early breeding season opens sites for recolonization by spotted owls and reduces competition from barred owls on remaining occupied spotted owl sites. Thus, barred owl removal during the early breeding season is effective for reducing the number of barred owl young produced and supporting spotted owls. However, not all areas are accessible for removal actions before barred owl eggs may have hatched or can be completely cleared before this date. The only way to effectively removal barred owls under these conditions is to accept some level of loss of young. Therefore, we have established timing recommendations, rather than requirements, to limit the orphaning of young.

We understand the distress this may cause some individuals, and do not make this decision lightly. We have updated the protocol to reduce this potential impact to young barred owls, but cannot completely eliminate such losses and still effectively reduce barred owl competition to support of spotted owl populations.

Comment 93

One commenter suggested that we specify that euthanasia of barred owls apply methods approved by the American Veterinary Medical Association (AVMA).

Response 93

We added the recommendation to specify that any euthanasia methods applied be approved by the Service or by the AVMA, where possible. Methods may change over the course of this permit and the AVMA notes that their methods are not always applicable in field situations. The Service will verify the methods that are acceptable under the permit.

Comment 94

Two commenters recommended allowing use of large caliber air rifles for removal. One expressed concern about the breadth of the pattern of shotgun pellets in removal in dark, forested environments and the other expressed concerns over the effect of noise of the removal specialists. Another commenter recommended the use of sound suppressors and ear protection to reduce potential disturbance to wildlife and minimize effects to removal specialists.

Response 94

Use of shotguns has been tested and proven effective in ensuring a quick kill across several studies. Shotguns, with multiple pellets and a shot pattern is an important part of the success. Removal is often done at night using bright lights, allowing good visibility for identification of the owls, but removal specialists may not be able to see very small twigs at intermediate distances that could deflect a single pellet. The presence of multiple pellets allows for a clean and quick kill even if a pellet or two are deflected. Air rifles, with a single pellet, are potentially somewhat more prone to missing under these circumstances and would therefore require additional care in setting up the removal.

The protocol allows the use of quiet or sound-suppressed shotguns, as long as they are legal under State and local laws. Removal specialists are allowed to use hearing protection, including electronic or non-linear devices that allow soft sounds to pass while reducing loud sounds. The protocol also allows capture and euthanasia in areas where firearms are not allowed or an issue. However, we realize that these options are not always available or adequate. We acknowledge that there may be situations and conditions where the use of air rifles can provide the same assurance of a quick and clean kill. Therefore, we have revised the protocol to include the ability for the Service to authorize the use of other methods, including air rifles, on a case by case and situational basis.

Comment 95

One commenter recommended the protocol in Appendix 2 be amended to require genetic testing of all removed hybrid owls to confirm their identity for use in future modifications to the protocol and to clearly understand the potential for inadvertent removal of spotted owls misidentified as hybrids.

Response 95

As suggested by the commenter, genetic testing of hybrids removed under the Strategy would provide additional information on these rare occurrences. The Service added a requirement for submitting suspected hybrids for genetic testing.

Comment 96

Several commenters expressed concern that allowing removal of hybrid spotted x barred owls could result in the accidental shooting of spotted owls. They recommended disallowing hybrid removal under the protocol and include only positively identified barred owls, as hybrids may be falsely identified in the field.

Response 96

The protocol for removal of hybrid spotted x barred owls is designed to require positive identification prior to removal or forego removal. The protocol requires that 2 observers trained in hybrid identification make a positive identification prior to removal and stresses the importance of walking away from the removal if there is any question about the identification. Individual implementers may choose not to remove hybrids.

Comment 97

Three commenters inquired about the training and certifications of removal specialists, and how they will be trained to know the difference between barred owls, spotted owls, and hybrids.

Response 97

Required qualifications and training are described in Appendix 2: Methodology for the Removal of Barred Owls from the Draft Barred Owl Management Strategy in the Strategy and EIS. This includes both auditory and visual identification. We have added specific requirements for specific training prior to removal of any hybrids.

Comment 98

Several commenters opined that the identification of barred and spotted owls was difficult and expressed concerns that training would not be sufficient to avoid the killing of non-target species, including spotted owls.

Response 98

The identification of barred and spotted owl is not more difficult than many bird species and, in fact, the two species have more distinct and visible identifying characteristics than some groups of birds (e.g., sparrows). Experience shows that trained specialists are highly adept at identification. The Service and its cooperators removed over 3,000 barred owls throughout the Barred owl Removal Experiment with no misidentification. An additional 1,500 barred owls were removed on studies in California with the same results.

The protocol is designed to minimize the potential for any non-target injury or death. It requires that the barred owl be stationary on an unobstructed perch (no shots at flying birds) and that the bird present a full, frontal, and unobstructed view, thereby displaying the characteristic features of the species. Removal requires identification by two qualified observers or a qualified removal specialist using both visual and auditory clues. Removal specialists are highly trained professionals and must be approved by the Service to operate under the Service's permit. These and the remaining components of the protocol ensure the highest standard in avoiding non-target killing.

If there is any non-target species injured or killed, the removal specialist must immediately notify the Service. If the non-target species is a listed species (including spotted owls) all removal activity is suspended until a review by the Service.

Comment 99

One commenter recommended addressing plumage characteristics that may increase the risk of inadvertently injuring or killing a spotted owl.

Response 99

As with most bird species, individuals of the species may display somewhat variable plumage characteristics. Some barred owls have less distinct barring, or appear darker than shown in most bird books, but all display the diagnostic characteristics to the trained observer. The requirement to use both visual and auditory identification, or the identification of two qualified observers reduces the potential that misidentification would result in injury or death of a spotted owl. In fact, spotted owl plumage is not highly variable, and any misidentification would be very unlikely to identify a spotted owl as a barred owl. Mistaking a darker barred owl for a spotted owl would be more likely, though still very rare, and would result in the removal specialist not taking a shot.

Comment 100

Two commenters noted that identification of juvenile owls is more difficult than adults and expressed concern that allowing removal of juveniles could lead to loss of spotted owl juveniles.

Response 100

Spotted and barred owls are more difficult to identify to species at some stages of development. However, removal of young barred owls helps to reduce barred owl populations and prevent some recolonization. We added additional direction on the removal of young to the protocol, maintaining the standard of no removal without positive identification.

Comment 101

One commenter suggested that removal specialists not remove barred owls with wet feathers as this may distort the important identifying characteristics.

Response 101

Any condition that prevents the removal specialist from positively identifying the individual owl to species would result in no removal. We do note that the identification of barred owls during night removals use both auditory and visual characteristics, further reducing the potential for misidentification.

Comment 102

Two commenters recommended that removal specialists work in pairs. One commenter recommended inexperienced removal specialists be required to work with an experienced person for two years. The other commenter allowed for single individuals to do removal, but required identification by both sight and sound prior to removal.

Response 102

The protocol in Appendix 2 includes requiring that identification be confirmed by two individuals where possible. This could be two removal specialists, or one removal specialist and one trained observer. However, it is not always possible to work in pairs. As removal specialists gain experience, a single specialist can effectively make the positive identification using both visual and auditory cues. We did not set a specific time requirement for paired work because the level of experience in identification will be related to the number of removals conducted and this

will vary widely depending on the density of the barred owl population and the intensity of the operation.

Comment 103

The commenter suggests adding firearms safety to the training and qualifications section.

Response 103

We have clarified the need for firearm safety training in the protocol.

Comment 104

Several commenters expressed concern with the use of volunteers, landowners, or non-professionals to remove barred owls. Several suggested permitting only trained specialists to conduct removal and some suggesting only Service or State personnel be used. One commenter expressed concern that private individuals or landowners could apply to be removal specialists and kill barred owls on public lands.

Response 104

All removals under the Strategy, and the Service's MBTA permit must meet the requirements described in Appendix 2, Section A2.1. Landowners and land managers interested in implementing barred owl management must apply to be designated to operate under the Service's requested MBTA permit and provide information on the proposed removal program. Individuals cannot apply to conduct removal on public lands, this must come from the appropriate agency, or in cooperation with the agency. All removal specialists must operate under such a program and be nominated to act as a removal specialist by the implementer. This may include private landowners and their agents for removal on private lands. However, whether Tribal, Federal, State, or private, all removal specialists must meet the qualifications described in Appendix 2 and be approved by the Service.

Comment 105

One commenter recommended that the Service address enforcement issues, including increasing enforcement capacity.

Response 105

The Service, as holder of the MBTA permit, is responsible for affirming that those designated to operate under the permit follow all elements of protocol. We will approve removal specialists based on the requirements described in the protocol (Appendix 2) and reserve the right to determine who can work under the permit. Anyone found to be violating the required elements of the protocol may have their designation to operate under the Service permit revoked.

Comment 106

Several commenters expressed the need for field monitoring of removal specialists. In some cases, the commenters assumed removal could be done by private citizens outside of a barred owl management program and with little oversight.

Response 106

All removal would be done by removal specialists approved by the Service to operate under the Service's MBTA permit. The Service will monitor the work of removal specialists through the reports and photographs submitted by each implementing entity. The Service may, at its discretion, conduct field visits to observe removal efforts. Any removal specialist found to have violated the required portions of the protocol may have their authorization revoked.

Comment 107

One commenter inquired if the public would be notified when barred owl removal would occur, and asked the Service to consider implementation a notification system or postings when lethal removal occurs on public land.

Response 107

Decisions on whether to post information on the location will be at the discretion of the implementing landowner or land manager, taking into consideration whether the area is open to public use and the intensity of that use. Removal would occur sporadically across a large landscape, making public notification difficult. Most removal would occur at night, limiting the intensity of recreational use. We do recommend informing local law enforcement and agency biologists, and contacting local landowners within the removal area to avoid unnecessary law enforcement response (Appendix 2, Section A2.3.2).

Comment 108

Two commenters suggested the Service use carcasses of removed barred owls for research, such as disease assessment or genetic research regarding hybridization.

Response 108

The protocol allows for carcasses to be transmitted to interested entities who hold the appropriate MBTA and State permits to receive or dispose of the specimen, providing carcasses to those interested in conducting research. While not a primary focus of the Strategy, the Service would certainly connect interested researchers with opportunities to obtain carcasses for research purposes as appropriate under the Proposed Action and any of the Action Alternatives.

A6.2.5 Strategy Comments - Implementation

Comment 109

Several commenters noted habitat loss is a primary threat to spotted owl populations, and recommended that the Strategy should incorporate other recovery actions focused on addressing habitat loss and fragmentation of mature and old growth forests. Some commenters expressed concerns that ongoing loss of northern spotted owl habitat has the potential to intensify barred owl competition by reducing the total amount of native resources available to the spotted owl and bringing barred owls into closer proximity with the spotted owl. Multiple comments recommended that the Service focus on conserving spotted owl populations through restoring, improving and protecting habitat, both in addition to, and in place of, barred owl removal.

Response 109

The Service has addressed how to improve the survival and recovery of the northern spotted owl through its recovery plan for the species, which describes the most important range-wide threats to the spotted owl as competition from barred owls, ongoing loss of spotted owl habitat as a result of timber harvest, habitat loss or degradation from stand replacing wildfire and other disturbances, and loss of amount and distribution of spotted owl habitat as a result of past activities and disturbances. The Service acknowledges and agrees with the commenters that a continued focus on habitat conservation and active forest restoration will be a critical part of recovery of this species. Indeed, the recovery plan notes that addressing the threats associated with past and current habitat loss must be conducted simultaneously with addressing the threats from barred owls. However, as described in the Strategy and EIS, the particular problem we seek to address here is direct competition between barred and spotted owls, as part of our efforts to improve the survival and recovery of northern spotted owls and to prevent declines in California spotted owls from barred owl competition. Comments and recommendations regarding the importance of, or need for, habitat protections are thus outside the scope of this proposed action and analyses.

Comment 110

Several commenters recommended that the Strategy and EIS include incentives for engaging in barred owl management, including regulatory incentives in some cases. One commenter suggested potentially developing an official land certification program and potential funding to support forest management. They also recommended focusing incentives in identified invasion corridors into the California spotted owl range and areas where northern spotted owls are most at risk of extinction. Four commenters recommended that the Service include incentives for landowners to adopt both habitat management practices and barred owl removal with the goal of accelerating northern spotted owl recovery.

Response 110

The Service will continue to explore options for incentives for the implementation of barred owl management once we have a final decision on the Strategy. We appreciate the suggestions provided by commenters. Issues specific to habitat management are outside the scope of this action.

Comment 111

One commenter recommended fostering collaboration with scientific communities, conservation organizations, and local communities in the approach to barred owl management.

Response 111

In developing the Strategy, the Service included collaboration with Tribal, Federal, and State agencies and incorporated public interests through comments on the Notice of Intent and the Draft Strategy and EIS. The Service will continue to work with all interested parties in implementation of the final Strategy, if selected.

Comment 112

Several commenters recommended that the Service develop and implement an active education and outreach effort with dedicated staff/funding, as part of implementation of the Strategy. The recommendation included outreach to potential implementers and partners as well as interested

publics. They also recommended including outreach specific to other species impacted by barred owls and reminding people that unsanctioned killing of birds remains illegal. Some commenters requested that a detailed outreach plan be included in the EIS.

Response 112

The Service has engaged in public outreach and education on the barred owl issue and development of the Strategy starting with the Notice of Intent to prepare an EIS in July of 2022. We continue to work closely with our Tribal, Federal, and State partners in the development of the Strategy and will continue to do so following any final decision, along with outreach to the public. Future education and outreach will be developed once the decision is completed. The Service will continue to take advantage of education and outreach that present themselves.

Comment 113

Several commenters expressed concern about the availability of adequate and long-term funding for implementation of the Strategy, including recommending a discussion of staff capacities and plans for securing funding.

Response 113

Funding will be an important part of implementing the action. However, it is difficult to apply or budget for funding without the specifics of the action. This framework strategy provides the information needed for interested landowners or land managers to apply for funding. We anticipate that funding will come from a variety of sources based on the implementing entities. Regardless, CEQ regulations do not require analysis of costs in an EIS.

Comment 114

One commenter recommended that the Service provide financial and strategic support to ensure implementation is effective across land ownerships.

Response 114

The Service will actively seek to encourage implementation of any final strategy. This may include, but is not limited to, seeking funding for implementation actions, staffing to provide strategic support to interested implementers, coordination with interested implementers, and monitoring. Regardless, CEQ regulations do not require analysis of costs in an EIS.

A6.2.6 Strategy Comments - Biology

Comment 115

One commenter noted that northern spotted owls are declining even in places where there are no barred owls.

Response 115

As discussed in the EIS and Strategy, competition from barred owls is not the only driver of spotted owl population declines, and both historical and recent habitat losses may influence current population dynamics. However, barred owls are present throughout the northern spotted

owl range, which means that barred owls are also present in every place where spotted owls are declining.

Comment 116

Several commenters recommended the Service initiate research on habitat preference differences between barred and spotted owls to inform subsequent management decisions. The commenters noted that previous research has suggested some differences between the habitat preferences of these two species, including different elevation preferences, though they noted that there is significant overlap in habitat. One commenter stated that spotted owls live at significantly higher elevations than barred owls. Another commenter pointed to Wiens et al. (2014) Figure 13 as demonstrating that differences between the seasonal survival probabilities of spotted owls and barred owls diminished with increasing levels of habitat and concluded that spotted and barred owls competed equally in areas with high levels of habitat.

Response 116

Directing research on habitat preferences is outside the scope of the action and does not require analysis in this EIS.

Biologists noted that early in the barred owl invasion of an area often started at lower elevations and on gentler slopes, with spotted owls remaining in higher elevation and steeper habitats. However, as barred owl population density increased and lower elevation habitat became saturated, barred owls expanded into these higher and steeper locations, and are now found at all elevations inhabited by spotted owls in areas where their populations are highest. As noted by several commenters, there is significant overlap in habitat use by barred and spotted owls.

One commenter pointed to Wiens et al. (2014), (Figure 13 as demonstrating that differences between the seasonal survival probabilities of spotted owls and barred owls diminished with increasing levels of habitat and concluded that spotted and barred owls competed equally in areas with high levels of habitat. However, seasonal survival probabilities, as displayed in the figure, do not account for competitive advantages of barred owls, or the barred owl's capability of attaining much greater densities relative to spotted owls. The estimated relationship between individual survival and forest condition shown in Wiens et al. 2014 (p. 27) does not account for occurrence of multiple barred owls within a spotted owl's home range or for evidence noted in Wiens et al. (2014, p. x) that barred owls excluded spotted owls from their core-use areas, which typically contained an equivalent percentage of older forest types relative to spotted owls (see Table 5; p. 17).

Long-term northern spotted owl population monitoring documents significant declines in northern spotted owl populations associated with increases in barred owl occurrence, with the strongest declines observed in northern populations where barred owls have been present longer or where they have reached higher densities or carrying capacity (Franklin et al. 2021, entire). This pattern has also been observed in areas with some of the best remaining and least fragmented spotted owl habitat, such as Redwood National Park in California, where barred owls have completely replaced spotted owls. Monitoring and observations indicate that barred owls are competitively dominant to spotted owls over a range of habitat conditions and that co-existence is unlikely as barred owls fully saturate spotted owl habitat.

The Strategy does not preclude additional research on habitat use, preference, and competitive ability between spotted and barred owl, though we note that this will be difficult in some areas where very few spotted owls remain for such research. Further research on habitat selection might provide some new insights into differences between habitat use by the two species, particularly related to initial settlement of barred owls on the landscape as they expand into new areas. However, given the condition of spotted owl population, the ongoing expansion of barred owl populations into the remaining habitat, the existing information on habitat overlap, and the impact of increasing barred owl populations on spotted owl survival, this Strategy is focused on managing barred owl populations to allow for survival of the northern spotted owl and preventing further stress on California spotted owls.

Comment 117

One commenter provided an extensive literature review concerning the potential for increased habitat area results in lower risk of extinction, though this was prefaced on "other things being equal".

Response 117

The Service considered information in the references provided by the commenter in development of the proposed Strategy. Increased habitat area might reduce barred owl competition if that habitat were actually available to spotted owls. However, the presence of high densities of barred owls, now documented in these areas, limits the ability of spotted owls to take advantage of additional, even high-quality, habitat. The commenter fails to account for the barred owl superabundance and very high densities in older forests used by spotted owls which essentially overrides the spotted owl’s ability to compete, regardless of how much habitat is available within its territory/home range.

Comment 118

One commenter suggested the Strategy note that northern spotted owls can nest in burned areas with a mosaic of burned and unburned terrain and provided an example from the Stehekin Valley in Washington.

Response 118

We agree with the commenter and acknowledge that spotted owls do continue to nest and reside in areas burned at low severity, or in a mosaic pattern of mixed severity. While we do not believe the draft Strategy implied otherwise, we have added clarification to some portions of the Strategy that discuss fire risk, generally with respect to the selection of FMAs.

Comment 119

One commenter stated that previous forest management approaches such as fire suppression have contributed to fire-prone forests, increased wildfire risks, and increasingly larger and more severe wildfires, which have subsequently reduced and degraded spotted owl habitat.

Response 119

Habitat loss to wildfire is one of the main threats to both the northern and California spotted owl subspecies. We agree with the commenters that in dry forests within the range of the spotted owl, the influence of past fire suppression and fire exclusion, combined with changing climatic

conditions, have increased the frequency and size of wildfires, resulting in habitat losses for spotted owls. The northern spotted owl recovery plan provides principles for dry forest management intended to allow for the restoration of ecological processes in dry forests, including fire burning at low or mixed severity, while conserving high value and high-quality spotted owl habitat. As the recovery plan notes, the threats associated with habitat loss must be addressed while simultaneously addressing the threats from barred owls. In this Strategy and DEIS, our purpose is to reduce barred owl populations to improve the survival and recovery of northern spotted owls and to prevent declines in California spotted owls from barred owl competition. Comments and recommendations regarding the importance of, or need for, forest management aimed at wildfire risk reduction are thus outside the scope of this proposed action and analyses.

Comment 120

Three commenters stated that hybridization was a natural process that can create new species and that interbreeding with barred owls may allow spotted owl genetics to persist at some level in hybrids or a new species.

Response 120

The Service does not consider hybridization to be a positive influence for spotted owls. Genetic swamping, with the resulting complete loss of parent genome, is the most likely effect of hybridization where one species (such as spotted owls) is rare and specialized (Rhymer and Simberloff 1996) and the other (such as barred owls) is common or in high numbers. Such hybrid swamping which can lead to the extinction of rare species (Tensen et al. 2024). But even if there were the potential for positive outcomes from hybridization in the case of spotted and barred owls in the West, demographic swamping by high numbers of barred owls would likely erase any genetic effects, positive or negative.

Relative to the Strategy, even the most expansive of the alternatives in the EIS at full implementation would remove barred owls or hybrids from only 50 percent of the northern spotted owl's range, leaving large areas where genetic interaction may continue to occur.

Comment 121

One commenter asked for clarification on the rarity of hybrids and asked how the Service would respond if hybrid occurrences increased.

Response 121

Spotted x barred owl hybrids are generally rare. For example, in the barred owl removal experiment study areas, each covering about 100 historic spotted owl pair areas, specialists removed one hybrid from the Cle Elum study area in the 5 years of the removal effort and 2 from the Hoopa study area over the 9 years of the removal effort (Higley 2023, entire). One additional hybrid was confirmed in the Union/Myrtle Klamath study area. The one exception to the rarity of hybrids was found in the Sierra Nevada portion of the California spotted owl range where hybrids were more common (Hofstadter et al. 2022, p. 281).

The Strategy allows for removal of hybrids, and this would remain the case even if hybrid owls are found in greater density in some areas, as was done in the experimental removal in the

northern Sierra Nevada (Hofstadter et al. 2022, entire). Under all alternatives, barred owl management would not occur on all lands within the province. Even with full implementation, hybrids will potentially be present outside of the management areas.

A6.2.7 Strategy Comments - Regulatory

Comment 122

Two commenters suggested that the ESA be amended to acknowledge or allow for both human-caused and natural environmental changes, and evolving understanding of evolutionary processes.

Response 122

Changes to the ESA are not within the scope of this EIS; changes to Federal law are made by Congress.

Comment 123

A commenter expressed concern over the voluntary nature of the strategy. They noted that Section 7(a)(1) of the Endangered Species Act requires all Federal agencies to use their authorities to carry out programs for the conservation of listed species and recommended the Service require other Federal agencies to implement the Strategy.

Response 123

Section 7(a)(1) of the ESA requires Federal agencies to utilize their authorities to conserve listed species, but it does not require that any particular action be taken with respect to any particular species, nor authorize the Service to compel any particular action. As stated in the Strategy, the Service will continue to encourage Federal agencies to implement the Strategy as part of their ESA section 7(a)(1) conservation planning.

Comment 124

Several commenters recommended the Service uplist the northern spotted owl from threatened to endangered.

Response 124

The Service has determined that the northern spotted owl warrants reclassification from a threatened to an endangered species, but as the species is already listed, and all of the prohibitions that would apply were it reclassified as "endangered" are already in place, the uplisting effort is of a lesser priority than listing consideration for species not yet evaluated. (88 FR 41560, 41578; June 27, 2023). Listing decisions are outside the scope of this action.

Comment 125

One commenter noted that barred owls are found in many areas outside of the range of the spotted owl, including urban areas. Young produced by these barred owls may disperse and recolonize areas. The commenter recommended including removal of barred owls outside the range of the spotted owl.

Response 125

The Strategy is focused on the conservation of the northern and California spotted owls. The range of northern spotted owls in Washington, Oregon, and California encompasses a very large area and is well populated with barred owls. Therefore, the focus on the Strategy in the northern spotted owl range is on areas where barred owl management could have a direct and immediate effect on spotted owls.

In the California spotted owl range, where barred owl populations are not yet well established and numbers are low, we have included recommendations to survey for and remove barred owls from the most likely invasion pathways. These areas include some populated areas. Therefore, some form of removal could occur in these areas, and this would likely be through capture and euthanasia.

Comment 126

One commenter noted that the section discussing the MBTA Special Purpose permit issuance does not include any public notice or public comment provisions and questioned whether we would issue such a permit without any public review.

Response 126

The proposed action evaluated in this EIS includes the proposed issuance of an MBTA permit to the Service, so public notice of the MBTA permit issuance and the opportunity to comment have been provided. Furthermore, as explained in the EIS (Section 1.3), part of the decision to be made is whether to issue the MBTA Special Purpose permit. Therefore, the eventual Record of Decision, which will be available to the public, will discuss issuance of the MBTA permit and provide a rationale for the decision.

Comment 127

One commenter suggested the Service focus on conservation of migratory birds, including barred owl and expressed concern with the issuance of a special use permit to lethally remove barred owls.

Response 127

Section 1.2 of the EIS describes that the purpose of the action is to reduce barred owl populations and explains the need for the action. The commenter does not identify any error in the need for the action. The EIS is an evaluation of effects of the proposed action, including the proposed issuance of an MBTA Special Purpose permit. The EIS includes an assessment of the effects of the action alternatives on the North American barred owl population, as well as the effects of not taking the proposed action, including the effects to spotted owl populations. The Service will make a decision on the proposed action, including whether to issue an MBTA Special Purpose permit under the MBTA regulations, in its record of decision, and will provide its rationale for doing so there, taking the analyses of the EIS into account.

Comment 128

Two commenters recommended that the Service limit the incidental take of spotted owls associated with habitat loss or degradation on Federal lands under land use plans and on private lands under HCPs.

Response 128

The northern spotted owl recovery plan acknowledges both the threat of habitat loss and barred owl competition. However, as described in the proposed Strategy and EIS, the particular problem we seek to address here is the barred owl threat. Comments and recommendations regarding the importance of, or need for, habitat protections are thus outside the scope of this proposed action and analyses.

Comment 129

One commenter recommended prohibiting the rehabilitation and release of barred owls in the West.

Response 129

Decisions concerning permitting of rehabilitation related to species under the MBTA is the responsibility of the Service's Migratory Bird Division and covered by regulations specific to these permits. Changes to these permits are outside the scope of this action.

Comment 130

Two commenters recommended the Service complete environmental impact statements under Federal NEPA, California State Environmental Policy Act and Washington State Environmental Policy Act laws to facilitate rapid implementation.

Response 130

Preparing environmental compliance documents under Washington State Environmental Policy Act and California State Environmental Policy Act laws may occur at the discretion of the States of Washington and California. The Service will continue to work with the States of Washington and California and provide any assistance we can for any needed State-level compliance.

A6.2.8 Strategy Comments - Clarifications

Comment 131

One commenter suggested the Service consider a review prepared for the Western Klamath Restoration Partnership that talks about the effects of barred owls on spotted owls.

Response 131

The Service was aware of this review article and cited the original research used in the review in the draft and proposed Strategy and EIS.

Comment 132

Several commenters provide recommendations for minor corrections, typographical efforts, clarifications, or added acknowledgements.

Response 132

The Service addressed and corrected the suggested minor corrections, clarifications, or acknowledgements in the Strategy and EIS.

A6.3 Comments - Out of Scope

The Service also received comments and questions outside the scope of the EIS, some of which relate broadly to forest management approaches or protections under the Endangered Species Act. While outside the scope of the Service's decision and this EIS analysis, we summarize and respond to certain comments of general interest below.

Comment 133

One commenter recommended that the Service commit to maintaining and increasing protections for the northern spotted owl during the current review process and ensuring that management of Federal lands are consistent with the Northwest Forest Plan going forward.

Response 133

The action under review in the EIS is focused on reducing the threat to spotted owls from barred owl competition. Comments related to Federal land management plans, including the Northwest Forest Plan revisions and the BLM's 2016 RMPs for Western Oregon, are outside the scope of this proposed action and analyses.

Comment 134

One commenter suggested the Service initiate additional research for long term forest management studies to include survivorship of northern spotted owl by suitable habitat patch size to better understand habitat requirements that minimize barred owl impacts on northern spotted owls.

Response 134

The purpose of the action under review in the EIS is focused on reducing populations of barred owls to reduce the threat to spotted owls from barred owl competition and providing a framework for interested entities to implement actions to reduce this threat. Studies to date have not identified any conditions under which spotted owls are able to outcompete barred owls (see response to comment 14. The Strategy does not prevent initiation of additional studies such as the one proposed but is outside the scope of this proposed action and analyses.

Comment 135

Two commenters expressed concerns over the presence of anticoagulant rodenticides in forest habitat and the potential impact on spotted owls. They recommended working with the appropriate Federal, State, and local agencies, and manufactures, to eliminate use of rodenticides in forests. One commenter recommended addressing rodenticide poisoning in Oregon.

Response 135

While working to reduce rodenticide in forest environment would be a valuable contribution to recovery, this is outside the scope of this action. We have provided some additional discussion of rodenticide results and risks in the northern spotted owl range in Section 4.2.2 of the FEIS, but addressing reduction in rodenticide use is outside the scope of this proposed action and analyses.

Comment 136

Several commenters recommended the Service consider captive breeding and reintroduction or translocation as tools to provide spotted owl for recolonization of areas where current spotted owl populations are very low and natural recolonization of spotted owls may not be possible.

Response 136

The purpose of this proposed action is to reduce barred owl populations to improve the survival and recovery of northern spotted owls and to prevent declines in California spotted owls from barred owl competition. Captive breeding and/or translocation of spotted owls are not within the scope of this EIS, which is focused on the management of barred owls. Captive breeding and/or translocation may be reasonable future approaches to increasing spotted owl populations, particularly where such populations are already very low. Successful reintroduction or translocation would require a reduction in barred owl populations prior to the reintroduction/translocation, or the released spotted owls would be subject to the same intense competition for territories.

Comment 137

One commenter requested the Service address how it plans to restrict or eliminate issuance of [incidental] take permits for spotted owls, suggesting prohibiting incidental take of spotted owls should be a prerequisite to use of the Strategy.

Response 137

The Service addresses habitat alteration and associated incidental take through a variety of mechanisms, including section 7(a)(2) consultations with Federal agencies proposing habitat-altering activities, and with non-federal entities seeking incidental take authorization in conjunction with a habitat conservation plan under ESA section 10. The Service takes into account the effect of barred owl competition in its analyses, and may indeed seek to limit or minimize incidental take resulting from habitat modification actions in particular contexts as warranted. However, restricting or prohibiting incidental take of spotted owls from habitat management is not a necessary prerequisite to undertaking barred owl management and is beyond the scope of the action.

A6.4 Summary of Submitted Information and Analyses

The following supplemental information (i.e., supplemental materials or references) was submitted during the public comment period for consideration by the lead and cooperating agencies in developing the FEIS (40 CFR 1502.17). All information was considered.

Literature

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