

Amended Final Environmental Assessment for the Issuance of Enhancement of Survival Permits to Roseburg Resources Co. to Authorize the Incidental Taking of Northern Spotted Owls in Douglas County, Oregon.

1.0 Introduction

The U.S. Fish and Wildlife Service (USFWS) is conducting a barred owl removal experiment to determine the utility of removal as a conservation tool for the threatened northern spotted owl (spotted owl). This action partially implements Recovery Action 29 of the 2011 Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011). The Experimental Removal of Barred Owls to Benefit Threatened Northern Spotted Owls (Barred Owl Removal Experiment or Experiment) (USFWS 2013a) is being implemented on four study areas, including the Union/Myrtle (Klamath) Study Area (Study Area) around Canyonville, Oregon. While the Experiment is focused on Federal lands, the landscapes involved in the study areas include significant interspersed nonfederal lands, including lands owned by Roseburg Resources Co. (RRC). Access to non-federal lands is important to efficient completion of the Experiment.

The USFWS and RRC have prepared a Safe Harbor Agreement (Agreement), whereby RRC will contribute to the conservation of the spotted owl by allowing researchers access to survey for barred owls on RRC lands throughout the Study Area, and to remove barred owls from RRC lands within the removal portion of the Experiment. This access and the resulting information collected by the researchers is crucial to efficient and effective implementation of this Experiment. Information from this Experiment is critical to the development of a long-term management strategy to address the barred owl threat to the spotted owl. RRC also provides information from spotted owl surveys conducted with support from RRC.

In return for access to RRC's lands and data from spotted owl surveys, the USFWS issued an Enhancement of Survival Permit (Permit) under Section 10(a)(1)(A) of the Endangered Species Act (ESA) (16 U.S.C. 1553 et seq.) for RRC lands in the Study Area in December 2016. The issuance of a Permit by the USFWS is a Federal action that may affect the human environment and therefore is subject to review under the National Environmental Policy Act (NEPA). This Environmental Assessment (EA) provides the compliance with NEPA. This Environmental Assessment (EA) was originally developed to assess the environmental effects of the Service's proposed Permit action on the human environment as required by NEPA. On the basis of the findings reported in the original EA, and consideration of public comments on the original draft EA, the Service reached a Finding of No Significant Impact (FONSI) on the human environment. The purpose of the amended EA is to ensure that the FONSI is the appropriate NEPA finding for the Permit action.

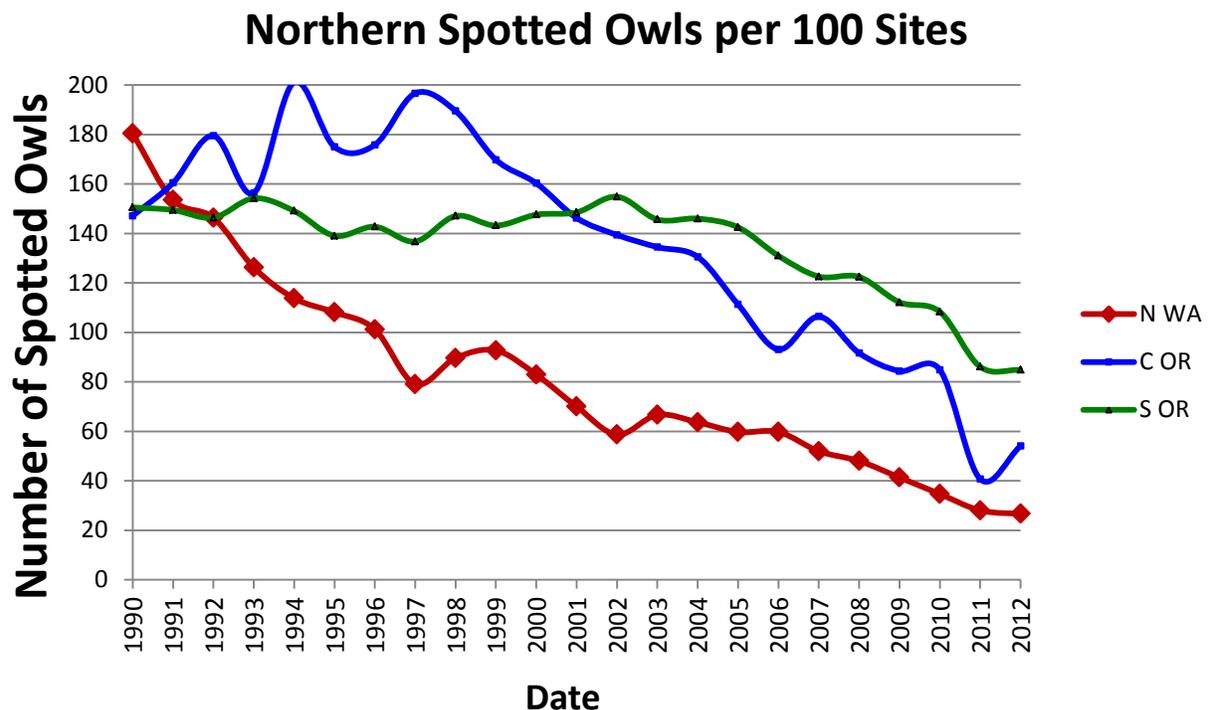
This EA has been amended to include additional analysis of the effects of issuing the Permits to RRC and Oxbow on spotted owl Critical Habitat (CH, Critical Habitat) and to update the cumulative effects section. The alternatives were developed before the Permits were issued, and have not been revised. All other sections of the EA remain as originally written.

1.1 Background on the Barred Owl Effect on Spotted Owls

Because the SHA is specific to the implementation of the Experiment, understanding the approach to and value of the Experiment is important to understanding the effects of the SHA.

The USFWS noted in the Final Environmental Impact Statement for the Experimental Removal of Barred Owls to Benefit Threatened Spotted Owls (FEIS) (USFWS 2013b) that spotted owl populations have been declining for many years, particularly in the northern part of their range. The Federal agencies track spotted owl populations on through several demographic studies spread across the range of the spotted owl. Populations on the Cle Elum Spotted Owl Demography Study Area in the Washington Cascades declined 85 percent between 1990 and 2013 (Figure 1) (Dugger et al. 2016). In the Oregon Coast Ranges Demographic Study Area, populations fell by 73 percent between 1997 and 2013 (Dugger et al. 2016). Even in southern Oregon, on the Klamath Demography Study Area, spotted owl populations have declined 45 percent from 2002 to 2013 (Dugger et al. 2016). Some of this decline is undoubtedly driven by habitat loss and habitat remains important to the conservation of spotted owls, but not all of these areas experienced significant declines in habitat during these timeframes (USFWS 2013b).

Figure 1. Plot of the number of spotted owls located per 100 sites surveyed on ongoing spotted owl demography studies.



Many of these observed declines appear to correlate with the invasion by, and increase in, barred owls. Barred owls are not native to the Pacific Northwest, arriving from Canada sometime after the 1950s. Recent spotted owl population demography analysis shows that the presence of barred owls has a strong negative effect on spotted owl annual survival rates and on the

colonization of new sites on some study areas (Dugger et al. 2016). (For more information on the background, see FEIS, USFWS 2013b).

The maintenance and development of spotted owl habitat is important to the long-term conservation of the spotted owl, but habitat management alone will not recover the spotted owl. In the short term, the effects of barred owl competition will likely overwhelm habitat management efforts, and may result in the extirpation of the spotted owl from large portions of the range. Thus, management of barred owl populations in the Pacific Northwest is crucial to the conservation of the spotted owl.

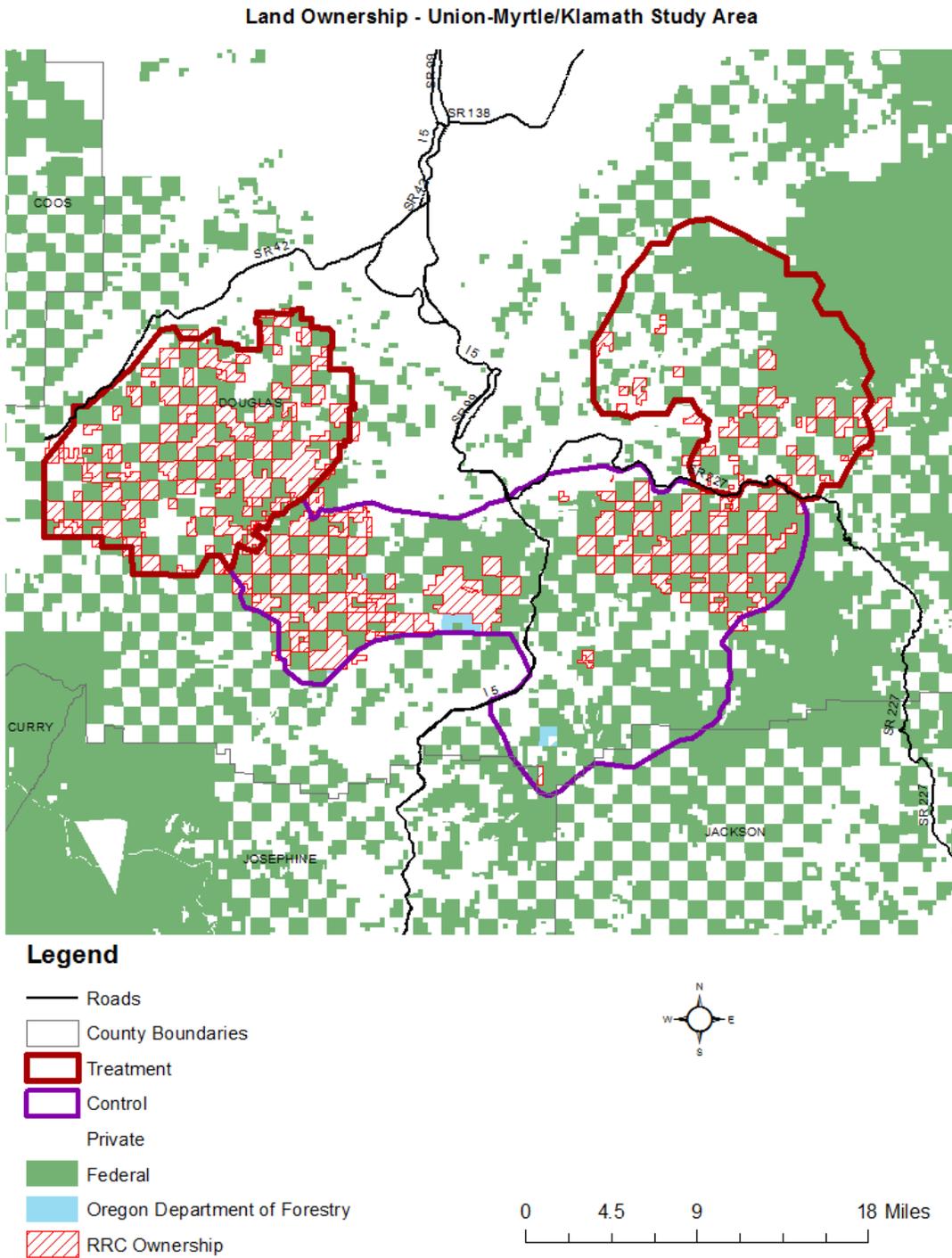
As early as 2005, scientist, biologists, and managers began exploring options for managing barred owl competition with spotted owls (Buchanan et al. 2007, Johnson et al. 2008). After several workshops and publications, it was determined the most feasible option for addressing the effect of barred owls on spotted owls is the removal of barred owls in areas to increase spotted owl populations (Gutiérrez et al. 2007, Johnson et al. 2008). While we continue to explore all options for spotted owl conservation, the USFWS identified the need to conduct an experiment to test the removal of barred owls, as described in Recovery Action 29 of the 2011 Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011).

In September 2013, the USFWS signed the Record of Decision to conduct experimental removal of barred owls to benefit threatened northern spotted owls (USFWS 2013a). The Experiment is being conducted on four study areas distributed across the range of the spotted owl, including the Union/Myrtle (Klamath) Study Area where RRC manages land. The Experiment involves dividing the Study Area into treatment and control areas. Barred owls will be removed from the treatment area and not from the control area. If spotted owls respond positively to the removal of barred owls, USFWS anticipates spotted owls will reoccupy historic sites that are currently unoccupied, and demographic parameters will improve (e.g. reproduction, adult survival), resulting in a spotted owl population increase in the treatment area. Spotted and barred owl populations in the control area are not anticipated to change as a result of the Experiment, though spotted owl populations may continue to decline as a result of increasing competition from barred owls.

To conduct the Experiment, researchers survey the entire Study Area for barred owls. Barred owls will be removed from the treatment areas during the non-breeding season (approximately September to March). Ongoing spotted owl surveys conducted under the Northwest Forest Plan Monitoring program and Bureau of Land Management (BLM) monitoring will continue. USFWS will use the data from these ongoing efforts to determine the effect that the removal of barred owls has on spotted owls.

RRC lands are intermingled with Federal and other lands on the Union/Myrtle (Klamath) Study Area (Map 1). While the Experiment can be conducted by surveying from public roads and removing barred owls on Federal lands, the resulting scientific data will be stronger and the efficiency will be greatly enhanced by access to nonfederal lands. In the Study Area, the Experiment will be greatly enhanced by access to RRC survey data, RRC lands for surveys, and permission to remove barred owls from RRC lands.

Map 1. General land ownership for Union/Myrtle (Klamath), including treatment and control areas.



1.2 Purpose and Need for Action

The USFWS' purpose for entering into a SHA and issuing an ESA section 10(a)(1)(A) Enhancement of Survival Permit to RRC is to gain access to important areas within the Union/Myrtle (Klamath) Study Area for barred owl surveys and barred owl removal. The need for access and information is to complete the Barred Owl Removal Experiment in the most efficient and effective manner for the conservation of the northern spotted owl consistent with Recovery Action 29 of the Recovery Plan (USFWS 2011, p. III-65). More specifically, the Experiment will allow the USFWS to: (1) obtain information regarding the effects of barred owls on spotted owl vital rates of occupancy, survival, reproduction, and population trend through experimental removal of barred owls; (2) determine the feasibility of removing barred owls from an area and the level of effort required to maintain reduced barred owl population levels for the duration of the Experiment; (3) estimate the cost of barred owl removal in different forested landscapes; and (4) develop the information necessary to contribute to developing future options for potential management of barred owls as expeditiously as possible.

RRC's purpose for the SHA is to demonstrate good faith cooperation with USFWS regarding this recovery action while maintaining a reasonable level of certainty regarding the anticipated biological response and subsequent regulatory requirements impacting both forest operations and management during and soon after the Experiment period.

RRC manages their Oregon timberlands utilizing forest practices and provides certainty of those forest practices achieving economic, community and stewardship values on a long term sustained yield basis while meeting State and Federal regulatory requirements. The RRC lands within the Study Area are a critically important part of the company's overall operating plans from both a short term and long term perspective with ongoing forest practices and management activities scheduled through the Plan. Therefore, in return for cooperation on the Experiment, RRC needs certainty for their continued forest operations and management on their lands as would occur in the absence of the Barred Owl Removal Experiment.

1.3 Regulatory and Planning Environment

Several Federal and State regulations and/or laws govern the activities under the SHA. A brief summary of relevant regulations is provided below.

1.3.1 Endangered Species Act

The ESA is intended to protect and conserve species listed as endangered or threatened, and to conserve the habitats on which they depend. The ESA also mandates that all Federal agencies seek to conserve endangered and threatened species and use their resources and authorities to further such purposes.

Section 9 of the ESA prohibits the "take" of Federally-listed endangered and threatened species unless authorized under the provisions of Section 7, 10(a), or 4(d) of the ESA. Section 3 of the ESA defines take as "to harass, harm, pursue, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Section 10 of the ESA allows USFWS to enter into an

agreement to enhance the propagation and survival of affected species. Section 2 of the ESA states that encouraging interested parties to develop and maintain conservation programs through Federal financial assistance and a system of incentives is a key to safeguarding the Nation's heritage in fish, wildlife, and plants. Section 7 of the ESA requires USFWS to review programs that they administer and to use such programs to further the purposes of the ESA.

An SHA under Section 10(a)(1)(A) of the ESA is a voluntary agreement between the USFWS and a non-federal landowner whose land management actions provide a net conservation benefit to species listed under the ESA. In exchange for complying with the SHA and Permit conditions that are reasonably expected to provide a net conservation benefit to listed species, the landowner is assured that the USFWS will not require additional management activities without their consent. In addition, under the SHA, landowners may return their lands to mutually agreed baseline conditions, as described in the SHA.

The Section 10 Permit associated with the SHA would authorize incidental take of spotted owls that may re-occupy currently unoccupied sites once barred owls are removed while the permit holder and their agents conduct forest management activities under current State regulations.

1.3.2 Migratory Bird Treaty Act

The spotted owl is protected under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-711) (MBTA). It is USFWS policy that an ESA Section 10 Permit for listed migratory birds is sufficient to relieve the permittee from liability under the MBTA. For the MBTA, this is accomplished by having the Permit double as a Special Purpose Permit authorized under 50 Code of Federal Regulations (CFR) 21.27. For the Experiment itself, the direct take of barred owls is covered by a MBTA Scientific Take Permit issued to the USFWS.

1.3.3 National Environmental Policy Act

Issuance of an ESA Section 10 Permit is a Federal action as defined under NEPA, 42 U.S.C. 4331 *et seq.* and its implementing regulations (40 CFR 1500 *et seq.*). With respect to SHAs in general, compliance with NEPA is not a direct obligation or requirement of the Applicant for the Section 10 Permit. However, the USFWS must comply with NEPA when making their decisions on the application and implementing the Federal action of issuing a Section 10 Permit. Consequently, the appropriate environmental analyses must be conducted and documented before a Section 10 Permit can be issued. The Service initially determined that an EA/Finding of No Significant Impact (FONSI) was appropriate for this action. If the Service determines that the environmental consequences of the action evaluated in this Amended EA are not significant, the Service would issue a new FONSI. This Amended EA analyzes the potential effects of implementing this SHA and issuance of a section 10(a)(1)(A) permit under the ESA for the incidental take of the spotted owl that may occur during implementation of the SHA.

1.3.4 Oregon Forest Practices Act

In Oregon, the Forest Practices Act (ORS 527.610) identifies forest practices as any operation conducted on or pertaining to forestland, including but not limited to: (a) reforestation of

forestland; (b) road construction and maintenance; (c) harvesting of forest tree species; (d) application of chemicals; (e) disposal of slash; and (f) removal of woody biomass. The rules specifically state that compliance with the forest practices rules does not substitute for or ensure compliance with the ESA and nothing in the rules imposes any state requirement to comply with the ESA. Landowners and operators are advised by the State that Federal law prohibits a person from taking certain threatened or endangered species, which are protected under the ESA.

Forest management operations must submit to the State Forester a written plan as required by ORS 527.670(3) before conducting any operations requiring notification under OAR 629-605-0140, including those operations within (1) 300 feet of a specific site involving threatened or endangered wildlife species, or sensitive bird nesting, roosting, or watering sites; or (2) 300 feet of any resource site identified in OAR 629-665-0100 (Sensitive Bird Nesting, Roosting and Watering Resource Sites on Forest lands), 629-665-0200 (Threatened and Endangered Species that use Resource Sites on Forest lands), or 629-645-0000 (Significant Wetlands), or (3) 300 feet of any nesting or roosting site of threatened or endangered species listed by the USFWS or by the Oregon Fish and Wildlife Commission by administrative rule. Written plans required under OAR 629-605-0170 must contain a description of how the operation is planned to be conducted in sufficient detail to allow the State Forester to evaluate and comment on the likelihood that the operation will comply with the Forest Practices Act or administrative rules.

Landowners that enroll in a SHA for barred owl control will receive regulatory assurances under the Forest Practices Act under OAR 629-665-0210(5). This rule states "Exceptions to the requirements for protecting northern spotted owl nesting sites are allowed if the operator is in compliance with, and has on file with the State Forester, an applicable incidental take permit issued by federal authorities under the Endangered Species Act." In other words, if a spotted owl establishes a territory on or near the enrollee's property during the term of the SHA, OAR 629-665-0210(5) will apply and Forest Practices Act regulations will not be required for nearby operations during the term of the SHA.

2.0 Alternatives

Two alternatives were developed as part of the original EA: the No Action Alternative and the Action Alternative. These alternatives have not been revised as part of this Amended EA.

2.1 No Action Alternative

Under the No Action Alternative, RRC would continue to manage its lands under current Federal and State regulations. The USFWS would not have access to RRC lands and roads within the Study Area. Barred owl surveys that require access to RRC lands and roads, or the ability to walk across RRC lands to access other ownerships, would not be conducted, resulting in gaps in the data for the Study Area. No barred owls would be removed from RRC lands within the treatment area, unless they can be called to adjacent lands. RRC forest management activities would not be covered for effects resulting in incidental take of spotted owls that may reoccupy the currently unoccupied sites near their lands.

2.2 Action Alternative

Under the Action Alternative, the SHA would be implemented in the Union/Myrtle (Klamath) Study Area and the USFWS would issue a Permit to RRC for a period of 10 years, based on the estimation that we will complete the Experiment after 4 years of removal activities. In the FEIS and ROD for the Experiment, (USFWS 2013a and b) the USFWS noted that if the spotted owl response to removal of barred owls is not as strong as anticipated the Experiment could include up to 10 years of removal. Therefore, the USFWS has analyzed the expected Permit length (10 years) and a Permit for 15 years in the event USFWS needs to extend the Experiment. In the latter case, this may assist us in considering whether to extend the Permit should an extension be requested by the permittee, although an amendment to extend the Permit may require additional NEPA compliance if we determine it would increase the amount of incidental take or cause effects on the environment not previously considered.

For USFWS to issue the Permit, the SHA must contain conservation measures that are reasonably expected to provide a net conservation benefit to spotted owls. The SHA must identify the baseline that will be maintained over the term of the SHA. The USFWS's Safe Harbor policy is available at: http://www.fws.gov/endangered/policy/SAFE_HAR.HTM and http://www.fws.gov/endangered/pdfs/FR/FRnoticeCCAA_SHAreg_revision.pdf. The following section briefly describes conservation measures outlined in the SHA. For more information, see the RRC SHA (RRC 2016) (incorporated by reference).

Under the Safe Harbor Agreement, RRC will:

- Provide access and permission for USGS and USFWS biologists, or their contractors reviewed and approved by RRC, to access RRC lands to survey barred owls throughout the Study Area. Surveys are conducted using digital callers from vehicles along improved roads or by walking unimproved, blocked, or decommissioned roads. Surveys for barred owls do not change the baseline condition of spotted owls and do not change any current limitations on RRC management as a result of spotted owl presence.
- Provide access to RRC roads and permission for USGS and USFWS biologists, or their contractors, to remove barred owls located on RRC lands within the treatment portion of the Study Area.
- Provide permission for USGS and USFWS biologists, or their contractors, to use roads owned or managed by RRC to access sites for the removal of barred owls located on Federal lands, and any other lands for which USFWS has landowner permission to remove barred owls within the treatment area of the Experiment.
- Temporarily defer forest practices in active nest stands to support nesting spotted owls that may reoccupy non-baseline sites during the nesting and rearing season (March 1 to September 30 of the year). The intent is to allow spotted owls that initiate nesting to complete nesting and fledge young. Timing and deferral areas will be determined in good faith by mutual agreement of the USFWS and RRC. At any time that biologists determine

the pair is no longer nesting, RRC will be notified and this seasonal restriction would no longer be in effect.

These contributions will allow the USFWS to complete the Experiment in an efficient and effective manner and minimize effects to nesting spotted owls that may re-occupy the non-baseline sites during the study. The information from this Experiment is crucial to the development of a long-term barred owl management strategy, which is itself essential to the conservation of the northern spotted owl.

Under the SHA, the USFWS established the baseline condition, for which no incidental take would be authorized. In the treatment portion of the Study Area, 30 occupied spotted owl sites (represented by their Thiessen polygons) overlap RRC lands or lands where RRC holds easements and agreements that allow them to access the covered lands for timber haul and management (Tables 1). Take will not be authorized on these 30 currently or recently occupied sites identified in Table 1.

Table 1. Baseline spotted owl sites for RRC SHA, Union/Myrtle (Klamath) Study Area.

BASELINE SPOTTED OWL SITES	
Master Site #	Spotted Owl Site Name
4538	Ash Creek
2097	Barrett Creek
2042	Boulder Creek
379	Chimney Rocks
367	Cookhouse Creek
1985	Corn Creek
1995	Corn Creek North
2383	Cowhead
362	Crab Louis Creek
375	Darby Creek
368	Dice Creek
370	Dice Trib
255	Dirty Rice
241	Doe Boy
3903	Etc
239	Heart Of Olalla
2199	JWT
2204	Kents Krypton
1808	Little Dads Creek
2748	Lower Berry Creek
1998	Lower St John
3268	Magic
2090	Ruby Ridge
3102	Salt Creek

1809	St Johns Creek
2149	Table Creek
1914	Thompson Creek
1915	Upper Thompson
2047	West Boulder
361	Wood Creek

The USFWS identified another 33 sites where spotted owls have not been detected in the past three years. These are the non-baseline sites (Table 2) for the purposes of the Experiment. If spotted owls reoccupy the non-baseline sites during or soon after the Experiment is implemented, they may be incidentally taken under the Permit by the covered activities.

Table 2. Spotted owl sites that are not baseline sites.

NON-BASELINE SPOTTED OWL SITES		
Master Site #	Spotted Owl Site Name	Last Year With Resident Spotted Owl Response
4588	Bear Naked	2012
1807	Berry Creek	2013
2098	Bushnell Creek	2009
2039	Coarse Gold Creek	2012
1930	Coffee Creek	2010
1994	Coffee Forks	2004
4053	Dads Table	2013
1810	Daybreak	2011
2148	Dayglow	2009
2088	Deadman Trib	2010
4051	Dutchman Butte	2012
1981	Emerson Bridge	2013
2093	Fate Creek	2007
1996	Granite Creek	2003
3097	Long Wiley	2011
4366	Lower Days	2006
2089	Maude Mine	2007
3907	Mount Shep	2002
2294	Myrtlewood	1991
307	Olalla Creek	2011
380	Old Chimney Rocks	2007
4049	Polan Creek	2013
4047	Quartzite Creek	2015
2203	Rondeau Butte	2009
257	Seventeen Rubys	2012
2321	Slater Creek	2012
2091	Stinger Gulch	2015
1999	Texas Gulch	2011

369	Upper Dice Creek	2015
2100	Upper Olalla	2007
3901	Wild Olalla	2006
2198	Wildcat Creek	2012
1984	Wood Creek East	2013

3.0 Affected Environment and Environmental Consequences

Potential impacts on the human environment from the Barred Owl Removal Experiment, including the No Action and Action Alternatives, were analyzed in the FEIS for the Barred Owl Removal Experiment (USFWS 2013b). The Affected Environment from the FEIS for the Barred Owl Removal Experiment is incorporated by reference. Impacts to resources on the covered lands from the activities analyzed in that environmental review and are incorporated by reference. This includes Effects on Barred Owls, Ongoing Spotted Owl Demographic Study Areas, Other Species, the Social Environment, Recreation and Visitor Use, the Economy, Costs of the Experiment, and the Cultural Environment.

In the FEIS, the USFWS stated its intent to explore the development of SHAs with interested nonfederal landowners.

“In the removal areas, the Service will explore the potential for Safe Harbor Agreements with nonfederal landowners willing to cooperate with the experiment. Safe Harbor Agreements are voluntary agreements under which landowners manage for listed species and their habitats with an assurance that they may later return their lands to the baseline condition without regulatory ESA restrictions. This could reduce the impacts of this experiment on timber harvest to a very low or no effect by providing management flexibility. However, as these are voluntary on the part of the landowner, and each is developed relative to the specific conditions of the area, we did not attempt to assume any specific reduction in the maximum potential effect (USFWS 2013b, p 218).”

As noted, the components of each SHA are developed with the landowner and specific to the circumstances of each landowner. Therefore, we were not able to address the specific effects of SHA to all resources.

We also tiered this EA to the Final EIS Affected Environment and Environmental Consequences (USFWS 2013, Chapter 3). The effects of the Experiment anticipated under the SHA are consistent with effects considered in the Preferred Alternative in the FEIS for the Barred Owl Removal Experiment on barred owls, spotted owls, ongoing spotted owl demographic study areas, other species, the social environment, recreation and visitor use, costs of the Experiment, or the cultural environment. As noted in the FEIS Effects to the Economy section, “[a]ny safe harbor agreements would lessen the effects described in the economic analysis” (USFWS 2013b, p 452).

The types of actions covered by the SHA and Permit for incidental take of spotted owls may potentially indirectly affect resources such as water quality and other species. However, due to

the particular circumstances described below, this SHA and Permit would only change the timing of such impacts, not influence whether they occur or not.

All covered activities under this SHA could be carried out at any time under current State laws and regulations. In the absence of issuance of the Permit, the non-baseline sites and areas are likely to remain occupied by barred owls and unavailable to spotted owls. With the absence of spotted owls, there is no prohibition against take and the covered activities would remain unrestricted.

The removal of barred owls in the treatment area may lead to reoccupancy of some of the non-baseline sites by spotted owls, which would result in a take prohibition of these spotted owls and could impact some of the covered actions in the absence of a Permit. However, the Barred Owl Removal Experiment is a short-term action, with a maximum of 10 years of removal. Activities would only be potentially restricted for as long as spotted owls remain on these sites. Once removal ceases, we fully expect barred owls from the surrounding areas to reinvade the treatment area, barred owl populations to regain their current levels, and spotted owls to be again displaced within three to five years (USFWS 2013b, p 173). At that time there will no longer be restrictions on any covered activities based on the take prohibition.

If the USFWS does not issue the Permit, barred owls will not be removed from RRC lands within the treatment area for the remaining duration of the study. Without the removal of barred owls, spotted owls are highly unlikely to reoccupy many of these sites, there would be no take prohibitions, and proceed at a normal rate. If spotted owls do manage to reoccupy some sites due to removal of barred owls on other adjacent ownerships, RRC may have to delay implementation of some activities until the Experiment ends and barred owls reclaim the areas. If USFWS does issue the Permit, the covered activities would proceed at normal rates. Therefore, the primary effect of the issuance of the Permit would be only to temporarily delay (up to 15 years maximum) the implementation of some of the covered activities.

For these reasons, the SHA and Permit would not significantly affect these other resources; therefore, we have limited our analysis to the potential effects on northern spotted owls and spotted owl CH. As discussed above, the effects to barred owls from the Experiment were fully considered in the FEIS (USFWS 2013b).

3.1 Effect on Northern Spotted Owl

The effects to the northern spotted owl resulting from RRC forest management on lands covered under the SHA were not considered in the FEIS. For the Background and Affected Environment and Environmental Consequences of the Barred Owl Removal Experiment, see the FEIS (USFWS 2013b, pp 143-162).

In the FEIS, we anticipated that the overall effects of the preferred alternative on spotted owls across the subspecies' range would be minimal. We did acknowledge the small potential for accidental killing of a spotted owl during barred owl removal efforts, though we noted that this is unlikely given the rigorous protocol for removal of barred owls in this Experiment (USFWS 2013b, p 150).

However, the USFWS noted the potential for an increase in spotted owl site occupancy as a result of the Experiment, and also noted that this was likely a short-lived improvement because barred owls are anticipated to reoccupy these sites soon after completion of the experimental removal.

“We anticipate decreased competition between spotted owls and barred owls on the treatment area for the duration of the Experiment, leading to a potential increase in spotted owl site occupancy rates following barred owl removal.” (USFWS 2013b, p148)

“Because the areas treated are small relative to the range of the northern spotted owl, the effect of barred owl removal on spotted owl site occupancy is expected to diminish after barred owl removal ceases. Barred owls are expected to increase to pre-removal levels after a lag of 3 to 5 years, resulting in subsequent declines in spotted owl site occupancy once the Experiment is concluded.” (USFWS 2013b, p149)

3.1.1 Effects on Spotted Owls under the No Action Alternative

Under this alternative, the USFWS would not issue a permit for incidental take of spotted owls to RRC. We anticipate that RRC would not allow USFWS access to their lands for barred owl surveys and would not give us permission to remove barred owls from RRC lands without the certainty that they could return to baseline condition. Thus, RRC would continue to manage their lands under current Federal and State regulations. USFWS would not have access to RRC roads and lands within the Study Area and would not remove barred owls on RRC lands in the treatment area.

The non-baseline spotted owl sites (where resident spotted owls have not been detected in at least three years), and areas outside the sites where spotted owls have not been located despite extensive surveys, are highly likely to remain unoccupied unless we remove barred owls from the area, and once verified, unoccupied sites receive no protection under State or Federal regulations. Even partial removal of barred owls from other ownerships in the area will likely leave enough barred owls in the area to potentially disrupt reoccupancy by spotted owls. Therefore, habitat on RRC lands associated with these non-baseline sites and areas could be harvested at any time under the No Action Alternative.

The Experiment, which this SHA supports, is a short-term study, estimated to include 4 years of barred owl removal, with a maximum duration of 10 years. In our analysis of the effects of the Experiment, we estimated that barred owl populations would return to pre-study levels within three to five years of the end of the barred owl removal (USFWS 2013b, p 148-9). Any spotted owl population gains from the Experiment are expected to be lost in this period. Thus, any spotted owls that do reoccupy the historic sites as a result of barred owl removal on accessible Federal lands would again be displaced within five years post-Experiment.

This was the expectation at the time of the decision to move forward with the Experiment (USFWS 2013a). The conservation value of the Experiment is specifically in the information on the effect of barred owl removal on spotted owl populations, the cost of such removal, potential

methodologies, and the value of this information to the development of a long term barred owl management strategy. The USFWS did not anticipate long-term conservation value from the spotted owls that might reoccupy historic sites in the study areas (USFWS 2013b).

If USFWS or its contractors cannot remove barred owls on RRC lands within the treatment portion of the Study Area, there will be substantial spatial gaps in our efforts to remove barred owl populations. This would lead to an imbedded population of barred owls within the treatment portion of the Study Area, providing an additional source of barred owls to recolonize recently cleared sites and affecting the ability of spotted owls to reoccupy non-baseline sites following barred owl removal.

The presence of an imbedded source population of barred owls could substantially reduce the power of the Experiment to detect the effect of barred owl removal on spotted owl populations, affecting our ability to meet the purpose and need of the Experiment. At the very least, this will complicate the analysis of the results of this Experiment. For example, if barred owls remain in an area, spotted owls may not be able to respond to the removal of barred owls on only a portion of the land within a historic spotted owl site. Removing some, but not all, of the barred owls that are currently utilizing an historic spotted owl site may not be enough to allow the spotted owls to return, masking the result of the removal.

Lack of access and permission to remove barred owls from RRC lands could lead to the need to extend the Experiment duration to compensate for weaker responses or could even completely mask the results. If barred owls are not removed on RRC lands within the treatment area, young produced at barred owl sites within the treatment area may increase the likelihood that currently unoccupied spotted owl sites would be reoccupied by barred owls, rather than spotted owls. In all cases, the lack of more complete removal could mask some of the experimental results and complicate the analysis, reducing the quality of data available to contribute to the development of a long-term barred owl management strategy.

3.1.2 Effects on Spotted Owls under the Preferred Action Alternative

Under the SHA, RRC would be permitted to take spotted owls that may reoccupy up to 33 historic but currently unoccupied spotted owl sites and other areas outside of baseline sites not known to have been previously occupied, during the Experiment, and for 5 years following the end of the Experiment, for a total of 10 years. If the spotted owl response to barred owl removal is not as strong as anticipated, the USFWS may extend removal for up to a total of 10 years, and in this case would consider extending the SHA and Permit for up to a total of 15 years. Spotted owls have not been detected on these non-baseline sites for three or more years.

3.1.2.1 Duration of the Spotted Owl Population Gains

The Barred Owl Removal Experiment is a short-term experiment, estimated to include four years of barred owl removal. In our analysis of the effects of the Experiment, we estimated that barred owl populations would return to pre-removal levels within three to five years of the end of the barred owl removal (USFWS 2013b, p 148-9). Any spotted owl population gains from the Experiment are expected to be lost in this period. Thus, any spotted owls that do reoccupy the

non-baseline sites or areas as a result of barred owl removal would again be displaced within five years post-Experiment, regardless of RRC's actions.

The eventual loss of the re-occupying spotted owls was the expectation at the time of the decision to move forward with the Experiment and the analysis of effects in the FEIS. The conservation value of the Experiment is primarily in the information gained on the effect of barred owl removal on spotted owl populations, the cost of such removal, and potential methodologies, and the value of this information to the development of a long term barred owl management strategy. The USFWS did not anticipate long-term conservation value from the spotted owls that might reoccupy the non-baseline sites or areas in the Study Area as a result of this short-term Experiment.

3.1.2.2 Incidental Take

Incidental take of spotted owls under this SHA would be in the form of harm or harassment. Harm would occur from forest operation activities that result in spotted owl habitat loss or degradation supporting a reoccupied spotted owl site, or potential new spotted owl sites that occur in non-baseline areas. Harassment is usually the result of disturbance during the early breeding season by loud, persistent activities.

Spotted owls use a relatively large home range, often including over three square miles of land. Within the treatment area, the Federal, State, and private lands are interspersed on a square mile or smaller scale. Thus, an individual spotted owl will use habitat owned and managed by several landowners.

3.1.2.2.1 Incidental Take as a Result of Habitat Removal

Most habitat-based take under this SHA would be a result of timber harvest. A small amount of additional habitat removal may occur with the development of roads to access lands for timber management or other operational activities. Within the treatment portion of the Study Area, 64 percent of the remaining spotted owl nesting/roosting habitat occurs on Federal lands, 18 percent on private lands, and 18 percent on RRC lands (Table 3). This is based on the habitat model described in Davis et al. (2016), the only habitat data available to USFWS that includes standardized habitat across all ownerships. This model includes habitat data current as of 2012. However, this model tends to overestimate habitat on private lands and does not include changes from timber harvest or other events since 2012. Thus, the actual amount of habitat on RRC lands in the baseline sites is likely much lower than the "worst case" represented in this analysis. The vast majority of RRC lands within the treatment area are in second growth managed forest and not providing habitat for spotted owls or currently occupied spotted owl sites. USFWS does not anticipate any significant ingrowth of habitat on RRC lands during the course of this Permit. While we use this information for the analysis of effects, this SHA does not define the mapped model results as habitat on the ground and does not apply any specific restrictions on these mapped lands. Any questions concerning potential take of a baseline site during the Permit duration would be addressed by both parties through review of the detailed data and condition of the specific stands and sites.

Table 3. Spotted owl nesting/roosting habitat within the treatment portion of the Union/Myrtle (Klamath) Study Area.

Spotted Owl Habitat within the Treatment Area, Union/Myrtle (Klamath) Study Area		
Landowner	Acres of Spotted Owl Habitat¹	% of Total Habitat
Federal	54,200	64
RRC	14,800	18
Other Private	15,600	18
Total	84,600	
¹ Includes suitable and highly suitable habitat, based on Davis et al. (2016) which tends to overestimate habitat condition on private lands.		

On the 33 non-baseline sites, RRC manages less than 10 percent of the total land within the Thiessen polygons at 10 sites, between 10 and 25 percent at 9 sites, between 25 and 50 percent at 8 sites, and greater than 50 percent of the lands at 6 sites (Table 5). However, most of these lands are in second growth managed forest and not providing habitat for spotted owls or currently occupied spotted owl sites.

The potential effect of the removal of spotted owl habitat under this SHA on the Experiment depends primarily not on the total amount of land base, but on the on the amount of habitat lost relative to the available habitat within spotted owls sites. There are 33 non-baseline spotted owl sites in the treatment area (Table 2) where incidental take is authorized under this SHA that include varying amounts of RRC lands (Table 4). These are the sites where incidental take resulting from habitat loss may occur under this SHA. Within the lands available for timber harvest on the non-baseline sites, RRC manages less than 10 percent of spotted owl habitat within the Thiessen polygons on 11 sites, between 10 and 25 percent of spotted owl habitat on 9 sites, between 25 and 50 percent on 12 sites, and greater than 50 percent of habitat on 1 site.

In the Union/Myrtle (Klamath) Study Area, the vast majority of the site centers are located on BLM lands, as this is where the majority of the high quality habitat remains. Under the SHA, RRC would be able to operate within non-baseline site centers that may occur on their lands, with the exception of active nesting stands. If spotted owls reoccupy non-baseline site centers on RRC lands and initiate nesting, RRC will temporarily defer forest practices in the nest stand to support the nesting spotted owls during the nesting and rearing season (March 1 to September 30 of the year). The intent is to allow spotted owls that initiate nesting to complete nesting and fledge young.

Table 4. Area and percent ownership of land and spotted owl nesting/roosting habitat within the non-baseline Thiessen polygons of spotted owl sites in the treatment portion of the Union/Myrtle (Klamath) Study Area where RRC owns lands.

Site Name		NSO Nesting/Roosting Habitat in Thiessen Polygon			Total Area in Thiessen Polygon		
		Federal	Private	RRC	Federal	Private	RRC
Bear Naked	Acres	632	201	59	1126	539	273
	%	71%	23%	7%	58%	28%	14%
Berry Creek	Acres	391	117	123	862	319	776
	%	62%	19%	20%	44%	16%	40%
Bushnell Creek	Acres	1022	634	624	1482	1157	827
	%	45%	28%	27%	43%	33%	24%
Coarse Gold Creek	Acres	825	71	358	1406	201	1376
	%	66%	6%	29%	47%	7%	46%
Coffee Creek	Acres	1088	10	22	1356	16	37
	%	97%	1%	2%	96%	1%	3%
Coffee Forks	Acres	572	8	78	802	11	273
	%	87%	1%	12%	74%	1%	25%
Dads Table	Acres	484	113	188	891	307	922
	%	62%	14%	24%	42%	14%	43%
Daybreak	Acres	450	358	309	831	1158	442
	%	40%	32%	28%	34%	48%	18%
Dayglow	Acres	220	212	11	369	547	20
	%	50%	48%	3%	39%	58%	2%
Deadman Trib	Acres	510	16	66	849	84	104
	%	86%	3%	11%	82%	8%	10%
Dutchman Butte	Acres	378	2	56	879	703	463
	%	75%	14%	11%	43%	34%	23%
Emerson Bridge	Acres	390	91	11	642	379	93
	%	79%	18%	2%	58%	34%	8%
Fate Creek	Acres	379	216	0	1070	857	1
	%	64%	36%	0%	55%	44%	0%
Granite Creek	Acres	685	122	316	775	243	526
	%	6%	11%	28%	50%	16%	34%
Long Wiley	Acres	447	497	46	624	1324	90
	%	45%	50%	5%	31%	65%	4%
Lower Days	Acres	639	421	303	1088	896	509
	%	47%	31%	22%	44%	36%	20%

Site Name		NSO Nesting/Roosting Habitat in Thiessen Polygon			Total Area in Thiessen Polygon		
		Federal	Private	RRC	Federal	Private	RRC
Maude Mine	Acres	559	16	82	798	92	179
	%	85%	2%	13%	75%	9%	17%
Mount Shep	Acres	927	183	458	1080	364	594
	%	59%	12%	29%	53%	18%	29%
Myrtlewood	Acres	188	172	2	255	757	11
	%	52%	48%	0%	25%	74%	1%
Olalla Creek	Acres	374	23	635	561	35	948
	%	36%	2%	62%	36%	2%	61%
Old Chimney Rocks	Acres	63	6	40	120	60	296
	%	58%	5%	36%	25%	13%	62%
Polan Creek	Acres	584	41	329	1045	209	1450
	%	61%	4%	34%	39%	8%	54%
Quartzite Creek	Acres	329	453	42	628	974	69
	%	40%	55%	5%	38%	58%	4%
Rondeau Butte	Acres	509	229	574	1043	534	1054
	%	39%	17%	44%	40%	20%	40%
Seventeen Rubys	Acres	363	178	36	494	527	103
	%	63%	31%	6%	44%	47%	9%
Slater Creek	Acres	254	34	67	1136	403	702
	%	72%	10%	19%	51%	18%	31%
Stinger Gulch	Acres	174	285	27	407	738	34
	%	36%	59%	6%	35%	63%	3
Texas Gulch	Acres	428	65	17	721	157	68
	%	84%	13%	3%	76%	17%	7
Upper Dice Creek	Acres	105	62	35	293	162	227
	%	52%	31%	18%	43%	24%	33
Upper Olalla	Acres	492	15	480	811	41	1300
	%	50%	1%	49%	38%	2%	60
Wild Olalla	Acres	769	38	747	1037	46	861
	%	49%	2%	48%	53%	2%	44%
Wildcat Creek	Acres	578	25	584	883	55	1056
	%	49%	2%	49%	44%	3%	53%
Wood Creek East	Acres	127	372	356	238	1547	724
	%	15%	44%	42%	9%	62%	29%

RRC manages a total of 35,800 acres of land and up to 7,080 acres of nesting/roosting habitat within the non-baseline Thiessen polygons. This represents approximately 10 percent of the total spotted owl nesting/roosting habitat in the treatment area. The habitat value is based on the best available standardized data available; but as noted earlier, the model used tends to overestimate spotted owl habitat on private lands and is current only through 2012. The majority of RRC lands within the treatment area are in second growth managed forest and not providing habitat for spotted owls or currently occupied spotted owl sites.

If spotted owls do reoccupy RRC lands, and initiate nesting, RRC will maintain the nest stand habitat for nesting spotted owls that may reoccupy non-baseline sites during the nesting and rearing season (March 1 to September 30 of the year). This supports the owl pair's to produce young and contribute to the future spotted owl population.

3.1.2.2.2 Incidental Take as a Result of Disturbance

USFWS has concluded that noise disturbance from the Experiment as resulting from the removal of barred owls on the treatment area does not rise to the level of take (USFWS 2013b). However, incidental take due to harassment could occur under this SHA if loud forest management activities occur during the early part of the nesting season in the vicinity of nesting spotted owls, including but not limited to routine harvest, road maintenance and construction activities, and rock pit development. USFWS data include the location of all known spotted owl site centers from over 20 years of spotted owl survey effort. Some sites may have multiple site centers as owls shifted their area of use, and many of these site centers represent nest sites. These historic site centers are the most likely to be reoccupied by spotted owls in response to barred owl removal, where habitat remains. Disturbance take is a short-term impact, limited to the year in which it occurs. It increases the potential for loss of nesting or young, but does not guarantee such loss.

If any non-baseline sites centers or near on RRC lands are reoccupied during the Experiment, if the spotted owls nest, and if RRC activities occur within close proximity to the centers, some disturbance may occur. Given the limited area affected by forest management activities in any individual year, there is only a small possibility that these activities would fall near enough to the occupied and nesting site centers to potentially disturb spotted owls. Given the short duration of forest management activities that might disturb spotted owls, the limited period of time during which noise may disturb spotted owls (early nesting season), and the relatively short distance over which disturbance due to noise is anticipated, any take resulting from disturbance is likely to be very limited.

3.1.2.3 Level of Contribution of RRC Lands to Spotted Owl Sites

RRC lands contain 18 percent of the suitable spotted owl habitat within the treatment portion of the Study Area. Of this, 7,080 acres of suitable spotted owl habitat lie outside of the baseline Thiessen polygons and would be potentially affected by the issuance of the Permit. This represents approximately 8 percent of the total spotted owl habitat remaining in the treatment portion of the Study Area. Incidental take of spotted owls that reoccupy non-baseline sites may

occur with the removal of this habitat (Table 2). No incidental take of spotted owls associated with the baseline sites is authorized by this SHA (Table 1).

The USFWS does not expect all of the non-baseline sites to be reoccupied as a result of the Barred Owl Removal Experiment. In addition, removal of some spotted owl nesting/roosting habitat may not result in incidental take of any spotted owls because the lands lie outside the areas used by spotted owls and because some sites may retain sufficient habitat to support the spotted owls. Incidental take due to disturbance is likely to be very limited. Spotted owls could be disturbed in the early nesting season if loud activities occur as a result of the actions under this Permit. Historic site centers are the areas that are most likely to be reoccupied by spotted owls with the removal of barred owls. However, given the short duration of forest management activities that might disturb spotted owls, the limited period of time during which noise may disturb spotted owls (early nesting season), and the relatively short distance over which disturbance due to noise is anticipated, take resulting from disturbance is likely to be very limited.

3.1.2.4 Effect of the Take on Local and Regional Spotted Owl Populations

The spotted owls that may be incidentally taken under this SHA are reoccupying sites or areas where no resident spotted owls have been located in the last three years despite extensive survey efforts. The most likely source of spotted owls that may reoccupy these sites is territorial spotted owls that were displaced from these sites and remain in the area as floaters (non-territorial, non-breeding) birds. A few replacement birds may be younger spotted owls produced on one of the few remaining spotted owl sites and still looking for a territory, therefore joining the floater population. We are unlikely to entice the remaining territorial spotted owls to abandon their current sites and move onto the non-baseline sites from which we are removing barred owls. Experience shows that once spotted owls establish a territory, spotted owls have a high inclination to remain on that familiar territory. Therefore, we do not anticipate that any of the spotted owls currently occupying baseline sites would move onto non-baseline sites and therefore be incidentally taken under this Permit.

We have no evidence that floaters (young and displaced territorial spotted owls) successfully breed unless they first become established on a territory. These individuals are unlikely to find and defend territory as long as barred owls remain in the area in the current densities. Thus, these non-territorial owls are not contributing to future generations and, in the absence of barred owl removal, will likely die without reproducing. If we remove barred owls, these spotted owls may be able to establish territories and reproduce, thus contributing to future generations during the removal period.

This Experiment is short term and covers a relatively small area. Once complete, we have every reason to anticipate that barred owl populations will return to current levels within five years and again displace these spotted owls, sending the spotted owls back into the floater population. The length of the Permit is designed to coincide with the end of the effects of the removal and return to baseline condition. Thus the Experiment and this Permit are not likely to reduce the current territorial population of spotted owls in the treatment area and may, in fact, protect these sites from incursions by expanding barred owl populations during the removal period. The

Experiment will also likely allow some non-territorial spotted owls to temporarily establish territories and contribute to the regional spotted owl population.

In developing the Experiment and analyzing the effect of the Experiment and this SHA, we did not anticipate long-term conservation contribution from the spotted owls that might reoccupy historic sites in the Study Area. The primary conservation value of the Experiment, and the SHA which supports the Experiment, is the information the USFWS will gain about the feasibility and efficiency of removal as a tool for barred owl management. This information will be crucial for the development of long term barred owl management strategies. The 2011 Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) clearly identified the need for the information that would be provided from the Barred Owl Removal Experiment. Thus, even with some small amount of habitat loss, the Barred Owl Removal Experiment still has significant value to the recovery of the spotted owl. It is important to note that all spotted owl habitat covered in the Permit, whether within or outside a spotted owl Thiessen polygon, are currently, or would soon be, allowed without additional restrictions in the absence of barred owl removal on RRC lands.

3.2 Effects on Northern Spotted Owl Critical Habitat

The Service revised the designation of spotted owl Critical Habitat in 2012. 77 FR 71876 (Dec. 4, 2012). According to that rule, the role of spotted owl CH is:

- To ensure sufficient habitat to support stable, healthy populations of spotted owls across the range and within each of the 11 recovery units,
- To ensure distribution of spotted owl habitat across the range of habitat conditions used by the species, and
- Incorporate uncertainty, including potential effects of barred owls, climate change and wildfire-disturbance risk.

The rule also identified the physical or biological features needed for the conservation of the spotted owl to include forested areas that are used or likely to be used by the spotted owl for nesting, roosting, foraging, or dispersing (USFWS 2012b, p. 71904). None of RRC's lands are designated as northern spotted owl CH. Activities that would be conducted in reliance on the Permit pursuant to this SHA on the RRC lands will not affect CH. However, under the SHA, RRC also would be provided incidental take authority covering actions pursuant to their rights under existing right-of-way agreements and easements in force at the time of the signing of the SHA. This includes rights to access their lands across Federal lands. The right-of-way agreements allow for roadbuilding, as well as road maintenance. The most likely potential effect to spotted owl CH from this Permit would be the result of tree removal to construct new roads through CH to access RRC timber on their lands. While some small spur roads may be temporary and allowed to revegetate, others may be maintained over time to allow for access for replanting stands, stand management, and firefighting. Therefore, for this analysis we are assuming that all roads are permanent.

3.2.1 Effects on Spotted Owl Critical Habitat under the No Action Alternative

Under this alternative, we anticipate that RRC would not allow access to their lands for barred owl surveys and removal without the certainty that they could return to baseline condition. Thus,

RRC would continue to manage their lands under current Federal and State regulations. The Service would not have access to RRC roads and lands within the Union/Myrtle (Klamath) Study Area.

The non-baseline spotted owl sites (where resident spotted owls have not been detected in at least three years), and areas outside the sites where spotted owls have not been located despite extensive surveys, are likely to remain unoccupied unless we remove barred owls from the area, and once verified, unoccupied sites receive no protection under State or Federal regulations. Therefore, we anticipate that RRC would continue to build roads as necessary and authorized by their existing right-of-way agreements under the No Action Alternative.

3.1.2 Effects on Spotted Owl CH under the Action Alternative

As described above, the primary effect of the Action Alternative is through the road building under their existing right-of-way agreements.

Road building is expensive, and only done when specifically needed to access timber. Most of RRC's lands included in this SHA have been previously harvested and the road system needed to access and manage these lands is already in place. This is particularly true for mainline access roads. However, because the Permits run for at least 10 years, we cannot know for sure where individual harvest units will be located and whether RRC will need additional road access. Therefore, we are assuming roadbuilding could occur on all Federal lands adjacent to RRC lands covered under the SHA, which we consider a conservative, overestimate of actual roadbuilding needs as the companies may have adequate access roads for some of their ownership. Most of their lands have been harvested or managed in the past and roads were constructed at that time.

We used the current level of roads on the public roads GIS layer to estimate the total miles of road per section. This GIS layer may not include short spur roads, or purely private roads, and therefore represents an underestimate of the actual total miles of existing roads per section. We use the calculated miles of roads per section to estimate the likelihood of the need for additional roadbuilding.

We are making the following assumptions to estimate the maximum level of roadbuilding that could occur under this SHA that may affect spotted owl CH. As noted above, it is unlikely that many of these roads will be needed. Sections with 6 or more miles of road are very well roaded and the companies would not need to travel far from existing roads. Therefore, in these situations, we estimate that, on average, only a single short spur road of ¼ mile would necessary. As road density declines, the need for roadbuilding to access their neighboring property increases. Therefore, we assume that on average the companies may need to build one ½ mile road segment in sections with 5 to 6 miles of existing roads. For sections with 4 to 5 miles of road, we assume 1 mile of road may be necessary; for sections with 3 to 4 miles of roads, we assume 1½ miles of road may be necessary; and for sections with less than 3 miles of roads, we estimated 2 miles of roads may be necessary. In the Union/Myrtle (Klamath) Study Area we assume an average clearing width of 40 feet. This results in the potential removal of trees from 4.6 acres of CH per mile of road. Because of the permanent removal of vegetation, these areas would no longer provide the physical and biological features of spotted owl CH.

Roadbuilding is most likely to be needed to access specific stands of RRC's timber from adjacent sections. Therefore, we analyzed the existing road network in sections of lands that are adjacent to (including cornering on) RRC lands. Lands that are more than one section distant are very unlikely to be affected by roadbuilding to access a stand on RRC lands because there would be other closer and less costly access options.

The Permits only authorize incidental take in areas within the non-baseline Thiessen polygons and areas outside of any spotted owl Thiessen polygon at the time of the signing of the SHA. Therefore, we are only considering effects to CH that occur outside of baseline Thiessen polygons. For each section included in the SHA, we calculated the acres of potentially affected CH, the miles of roads, and whether the section was adjacent to a section where RRC lands. Using the miles of existing roads in the section, we calculated the number of potential new road segments that might be needed in any section that was adjacent to the RRC lands. Finally we added up the total number of potential new road segments and calculated the acres potentially affected. Because we used conservative (worst-case) assumptions in each step in the process, this is likely a significant overestimate of the actual effect.

Based on this analysis, we anticipate the potential removal of trees from up to 217 acres of CH adjacent to RRC lands. All removal would be in long, narrow, linear segments, with a maximum of approximately 9.2 acres per section (640 acres). Some of these acres are not currently spotted owl habitat, but could become so in the future. Because the effect of roadbuilding is assumed to be permanent, we will consider this potential activity as affecting CH.

All of this potential activity would occur in the Klamath Mountains Physiographic Province, in 2 CH units – the Klamath West and the Klamath East. The Klamath West CH unit contains 1,197,389 acres in nine subunits, only one subunit of which is affected by this SHA, K LW-1. The Klamath East CH unit contains 1,052,731 acres in seven subunits, only one subunit of which is affected by this SHA, KLE-2 (USFWS 2012). Most of the CH in the Klamath Physiographic Province, which includes this CH unit, is in Federal ownership and is managed under the Northwest Forest Plan and BLM Resource Management Plans. Under these plans, CH within the subunit is expected to improve and increase in habitat condition over time.

This SHA includes lands in 2 CH units (totaling 2,250,100 acres), and one CH subunit in each unit. In total, CH for the spotted owl includes 9,578,000 acres of land.

- K LW-1. The K LW-1 subunit consists of approximately 147,300 acres in Douglas, Josephine, Curry, and Coos Counties, Oregon, and includes lands managed by the State of Oregon and the Bureau of Land Management (BLM). These Permits may result in the removal of trees on up to 100 acres of CH in this subunit, with a maximum of approximately 9.2 acres in any single section.
- KLE-2. The KLE-2 subunit consists of approximately 101,942 acres in Josephine and Douglas Counties, Oregon, and includes lands managed by the U.S. Forest Service (USFS) and the BLM. These Permits may result in the removal of trees on up to 117

acres of CH in this subunit, with a maximum of approximately 9.2 acres in any single section.

An incidental take permit from the Service is not needed to conduct timber harvest on RRC lands affecting unoccupied spotted owl habitat, as this activity would not result in take of the spotted owl. The issuance of the Permits authorizes the take of resident spotted owls that may reoccupy 33 currently unoccupied spotted owl sites, and some unoccupied areas outside of spotted owl Thiessen polygons, during the Experiment and for five years following the Experiment to allow for return to baseline conditions. These areas did not have resident spotted owls documented in at least the three years prior to issuance of the Permits. This take may occur through the removal or degradation of habitat, such as that which could occur with the construction of roads under the existing right-of-way agreements. Therefore, the maximum potential effect of the SHA and Permits on CH is the removal or degradation of up to 217 acres of spotted owl CH during the Permits' term. In the absence of re-occupation of these areas by spotted owls, these actions that may affect spotted owl CH would not be regulated under the ESA because the prohibition on take of a listed species would not apply and RRC would not need the Permits to conduct the activities. Once the Experiment is complete, we anticipate barred owls will reclaim these areas within 5 years, spotted owls will again be displaced, and the take prohibition will no longer apply. In other words, the SHA and the Permits would only change the timing of such impacts, not influence whether they occur or not because barred owls have currently displaced spotted owls from historically occupied, non-baseline sites on RRC lands and are very likely to do so again following completion of the Experiment.

Spotted owl CH that overlaps the covered area under the SHA is located in Unit 9 (Klamath West), Subunit K LW-1 and Unit 10 (Klamath East) subunit K LE-2. As described above, the maximum potential effect of the issuance of the Permits would likely be the removal or degradation of up to 217 acres of spotted owl reoccupied habitat, up to 100 acres in K LW-1 and 117 acres in K LE-2. The actual location of the habitat removal or degradation will only be known when RRC timber sale planning is complete.

CH Unit 9, Subunit K LW-1 consists of approximately 147,300 acres, including lands managed by the State of Oregon and the BLM. Federal lands comprise 139,600 acres, or 95 percent, of this subunit and these are managed under the BLM Resource Management Plans. The spotted owl CH Final Rule identified that "[s]pecial management considerations or protection are required in this subunit to address threats to the essential physical or biological features from current and past timber harvest, losses due to wildfire and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function for demographic support to the overall population and for north-south and east west connectivity between subunits and critical habitat units. This subunit sits at the western edge of an important connectivity corridor between coastal Oregon and the western Cascades." (USFWS 2012, p. 71931). The Experiment, which is the impetus behind the Service's objectives for the SHAs and Permits, is designed to assist the Service in addressing the threat of barred owl competition.

If trees are removed from up to 100 acres of spotted owl CH in K LW-1 covered by the SHA and the Permits for RRC within this subunit, this would represent a loss of less than 0.07 percent of CH within the subunit. Because of the small and scattered nature of these areas (no more than

9.2 acres per section), they are less likely to cause changes in the way that spotted owls use the area and may mimic natural forest gaps in some instances. In addition, most CH in this subunit is on Federal lands (95 percent) where land management is resulting in an increase in the quality and quantity of spotted owl habitat. Therefore, this level and the scattered distribution of CH loss is not likely to appreciably reduce the conservation value/function of the CH subunit for demography support of the CH unit or overall spotted owl population. In addition, because of the scattered nature of potential tree removal and the potential loss of up to only 100 acres of in this CH unit, this loss would not appreciably affect the north-south or east-west connectivity between CH subunits, or its function as a connectivity corridor between coastal Oregon and the western Cascades.

CH Unit 10, Subunit KLE-2 consists of approximately 101,900 acres, including lands managed by the BLM and the USFS. This subunit is comprised totally of Federal lands managed under the Northwest Forest Plan and BLM Resource Management Plans. The spotted owl CH Final Rule identified that "[s]pecial management considerations or protection are required in this subunit to address threats to the essential physical or biological features from current and past timber harvest, losses due to wildfire and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function primarily for east-west connectivity between subunits and critical habitat units, but also for demographic support. This subunit facilitates northern spotted owl movements between the western Cascades and coastal Oregon and the Klamath Mountains." (USFWS 2011, p. 71934). The Experiment, which is the impetus behind the Service's objectives for the SHA and Permits, is designed to assist the Service in addressing the threat of barred owl competition.

If trees are removed from up to 117 acres of spotted owl CH covered by the SHA and the Permits by RRC within this subunit, this would represent a loss of less than 0.1 percent of CH within the subunit. Because of the small and scattered nature of these areas (no more than 9.2 acres per section), they are less likely to cause changes in the way that spotted owls use the area and may mimic natural forest gaps in some instances. In addition, this subunit is completely on Federal lands where land management is resulting in an increase in the quality and quantity of spotted owl habitat. Therefore, this level and distribution of CH loss is not likely to appreciably reduce the conservation value/function of the CH subunit for demography support of the CH unit or overall spotted owl population. Because of the scattered nature of potential tree removal that may be affected, (maximum of 9.2 acres per section) and the loss of up to 117 acres of CH total, this loss would not appreciably affect the north-south or east-west connectivity between CH subunits, or its function as a connectivity corridor between the western Cascades, coastal Oregon, and the Klamath Mountains.

At a regional scale, 217 acres of spotted owl habitat loss in CH Units 9 and 10 as a whole would represent 0.01 percent of these CH Units. At the scale of the full designation, the 217 acres represents less than 0.002 percent of spotted owl CH. This potential loss of CH would not appreciably reduce the conservation value/function of the CH subunit for demographic support of the overall spotted owl population because of the limited and scattered nature of potential tree removal (up to 9.2 acres per section involved), the fact that the vast majority CH habitat within this subunit would remain unaffected, and the distribution of the potential tree removal such that CH loss would not appreciably affect the north-south or east-west connectivity between CH

subunits, or its function as a connectivity corridor between the western Cascades, coastal Oregon, and the Klamath Mountains.

Considering the above findings, the Service concludes that the SHA and Permit are not expected to create an alteration that appreciably diminishes the value of CH subunits K LW-1 and KLE-2 for the conservation of spotted owls as adverse impacts will occur on only a very small portion (much less than 1 percent) of these subunits. The CH subunits K LW-1 and KLE-2 are expected to continue to provide for the life history needs of the spotted owls. As such, the conservation needs of the spotted owl will not be significantly impacted at the subunit, unit and range-wide scales. Furthermore, the SHA is likely to facilitate beneficial effects to the recovery function of spotted owl CH by assessing the effects of barred owl removal from that habitat on the capability of that CH to support spotted owls. Absent barred owl removal, current and expanding barred owl populations may preclude spotted owl occupation and use of that habitat.

3.3 Cumulative Effects

Cumulative Effects from the Barred Owl Removal Experiment, including the No Action and Action Alternatives were analyzed in the FEIS for the Barred Owl Removal Experiment (USFWS 2013b, p. 239). The Cumulative Impacts Section of the FEIS for the Barred Owl Removal Experiment is incorporated by reference. The Barred Owl Removal Experiment is currently being implemented on this Study Area and barred owls are being removed from lands within the treatment portion of the Study Area. This SHA contributes to the full implementation of the Experiment. This analysis evaluates effects not reasonably foreseeable at the time of the FEIS.

The Council on Environmental Quality's regulations for implementing NEPA define cumulative effects as: "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions" (40 CFR § 1508.7). The effects of the proposed project and the conditions resulting from past are contained in the above Section 3.1.

The SHA with RRC on the Union/Myrtle (Klamath) Study Area is the first SHA in this region. The USFWS has completed three SHAs in the Oregon Coast Ranges Study Area. The Oregon Coast Ranges Study Area is more than 75 miles from the Union/Myrtle (Klamath) Study Area. These SHAs are not in the vicinity of this SHA, but are within the range of the spotted owl. We anticipate no specific interaction with the activities or effects of the SHAs in the Oregon Coast Ranges Study Area on the Union/Myrtle (Klamath) Study Area due to the distance and natural barriers. The three SHAs in the Oregon Coast Ranges were with RRC and Oxbow Timber I, LLC (Oxbow), Weyerhaeuser Company, and the Oregon Department of Forestry (ODF) to facilitate the Experiment.

RRC and Oxbow own approximately 9,400 acres of forest lands within the treatment portion of the Oregon Coast Ranges Study Area in Lane County, Oregon. The RRC and Oxbow SHA and Permit authorizes incidental take of spotted owls that may reoccupy up to 19 non-baseline sites and areas as a result of the harvest or modification of 308 acres of nesting/roosting habitat. RRC

and Oxbow own no habitat on 6 of the 19 non-baseline sites covered under their permit, less than 10 percent of the nesting/roosting habitat on 11 of the sites, and 14 and 29 percent respectively on the remaining two sites.

Weyerhaeuser Company owns approximately 1,072 acres of forest lands within the treatment portion of the Oregon Coast Ranges Study Area in Lane County, Oregon. The Weyerhaeuser SHA and Permit would authorize incidental take of spotted owls that may reoccupy up to 16 non-baseline sites and areas as a result of harvest or modification of 817 acres of nesting/roosting habitat. Weyerhaeuser owns less than 3 percent of the habitat on 6 of the 16 sites, less than 5 percent of the habitat on 9 of the 16 sites, and less than 10 percent of the habitat on all sites.

ODF manages approximately 20,000 acres of forest lands within the treatment portion of the Oregon Coast Ranges Study Area. The ODF Safe Harbor Agreement and Permit authorizes take of spotted owls that may reoccupy up to 18 non-baseline sites and areas, as a result of the harvest or modification of 3,345 acres of nesting/roosting habitat. The SHA provides for an elevated baseline, and as such ODF did not receive take authorization for some sites that are covered in this SHA and the Weyerhaeuser Safe Harbor Agreements.

All four of the SHAs (RRC and Oxbow, Weyerhaeuser, ODF, and this SHA for RRC in Douglas County) contain the same basic requirements of the applicants: 1) access to lands and roads for the survey of barred owls on the applicant's lands throughout the study area; 2) access and permission to remove barred owls from the applicant's lands within the treatment portion of the study area; and 3) avoidance of disturbance of actively nesting spotted owls. All four completed SHAs would contribute to the implementation of Recovery Action 29 through support of the Barred Owl Removal Experiment. The information gained from this Experiment is critical to the development of a long-term management strategy to address the barred owl threat to the spotted owl as part of the recovery strategy for the northern spotted owl. Access to the lands included in this SHA is crucial to efficient and effective implementation of this Experiment.

As described in the "Effect of the take on local and regional spotted owl populations" section above, the non-baseline sites covered by all of the Permits are not currently occupied by spotted owls and are unlikely to become reoccupied unless the Experiment is implemented. The Experiment and these Permits are not likely to reduce the current territorial population of spotted owls in the treatment area and may, in fact, protect these sites from incursions by expanding barred owl populations during the removal period. The Experiment and these Permits will also likely allow some non-territorial spotted owls to temporarily establish territories and contribute to the regional spotted owl population.

The primary conservation value of the Experiment, and the SHAs which support the Experiment, is the information the USFWS will gain about the feasibility and efficiency of removal as a tool for barred owl management. This information will be crucial for the development of long range barred owl management strategies. The 2011 Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) clearly identified the need for the information that would be provided from the Barred Owl Removal Experiment. This SHA will contribute to our ability to remove the majority of barred owls from the treatment area and avoid creating pockets of barred owls within the treatment area that could reduce the power of the Experiment to detect the effect, and thereby

lengthen the duration of the Experiment. Thus, even with some habitat loss, the Barred Owl Removal Experiment still has significant value to the recovery of the spotted owl.

Under this Permit, RRC would be able to continue normal operations, potentially resulting in the removal of up to 7,080 acres of spotted owl nesting/roosting habitat, generally equating to older diverse forests. This represents approximately 8 percent of the nesting/roosting habitat available in the treatment portion of the Study Area, 4 percent of the nesting/roosting habitat in entire Study Area, 0.6 percent of the habitat in the Oregon Klamath Physiographic Province, one of 11 physiographic provinces in the range of the northern spotted owl, and 0.08 percent of the spotted owl nesting/roosting habitat range-wide.

Between all four of the SHAs (RRC and Oxbow, Weyerhaeuser, ODF and this SHA), a total of up to 11,500 acres of nesting/roosting habitat would be available for harvest. This represents less than 0.1 percent of the spotted owl nesting/roosting habitat rangewide.

Within the Union/Myrtle (Klamath) Study Area, which occurs within the Klamath East and Klamath West CH units, there are no other SHAs being currently developed and no other permits have or are likely to be issued.

Within the Oregon Coast Ranges critical habitat unit, the Service has issued Permits to RRC, Oxbow, Weyerhaeuser, and ODF that that may result in effects to spotted owl critical habitat. While no CH was designated on private lands, the companies are anticipated to modify up to 585 acres of CH and under the Weyerhaeuser SHA up to 339 acres may be modified by roadbuilding under existing right-of-way agreements. These are the maximum losses anticipated, are likely to be scattered, narrow, and linear openings with a maximum of 11.6 acres in any one section. The ODF SHA includes 12,140 acres of designated CH on ODF lands within non-baseline sites or areas. Most of this is not currently nesting/roosting habitat, and some of these lands are protected under current ODF forest plans. Under the ODF SHA and Permit, ODF may take spotted owls as a result of forest management activities in spotted owl habitat on non-baseline sites and areas that include up to approximately 3,345 acres of nesting/roosting habitat in CH. Therefore, under all three SHAs in the Oregon Coast Ranges CH Unit 2, we anticipate the total maximum loss of no more than 4,269 acres of habitat within CH Unit 2, in scattered areas within the Oregon Coast Ranges Study Area treatment area. This represents approximately 0.5 percent of CH in the CH Unit and 0.04 percent of spotted owl CH rangewide. This limited and scattered nature of the loss of trees in this large CH unit will not significantly reduce the conservation value/function of the CH unit for demography support of the CH unit or overall spotted owl population as well as north-south and east-west connectivity between CH subunits. The Experiment that these SHAs support will contribute to the special management needs of this CH unit in search for methodologies to address the threat from competition with barred owls (USFWS 2012, p. 71922).

Under this SHA, we anticipate the total maximum loss of no more than 217 acres of habitat in CH in the combined Klamath West and Klamath East CH Units. Total across all four SHAs, we anticipate a potential loss of no more than 4,486 acres of CH under these SHAs, equating to 0.05 percent of CH rangewide. Again, the limited and scattered nature of the loss of trees in this large CH unit will not significantly reduce the conservation value/function of the CH units.

3.3 Conclusion

For the following reasons, the USFWS concludes that the issuance of a Permit allowing incidental take of non-baseline spotted owls resulting from implementation of the RRC SHA in the Union/Myrtle (Klamath) Study Area will not significantly impact the northern spotted owl.

- The SHA does not authorize incidental take of spotted owls in 30 currently or recently occupied spotted owl sites (Tables 1) that overlap RRC managed lands. These are the baseline conditions for the SHA and are not covered by the incidental take permit. Issuance of the Permit to RRC will allow the removal of barred owls on RRC lands, which may actually protect the remaining territorial spotted owls from incursions by expanding barred owl populations during the removal period.
- The spotted owls that may be taken under the Permit are only temporarily reoccupying non-baseline sites or areas.
 - The experimental removal of barred owls will be conducted for an estimated four years, with a maximum of 10 years, after which barred owls are anticipated to again displace spotted owls from these sites as the barred owl population rebuilds over the following three to five years.
 - Spotted owl presence on these sites is temporary in all cases. Any non-baseline sites that become occupied by spotted owls during the Experiment would likely become unoccupied again as barred owls repopulate the area following the end of the removal Experiment.
 - In developing the Experiment and assessing the effects in the FEIS (USFWS 2013b), we did not anticipate long-term conservation value from the spotted owls that might reoccupy historic sites in the Study Area.
- The conservation value of the Permit is its support of the Experiment and, thus, in the information gained from the Experiment regarding the effect of barred owl removal on spotted owl populations, the cost of such removal, and potential methodologies, and the value of this information to the development of a long term barred owl management strategy.
- The Permit will authorize incidental take of any spotted owls that may reoccupy up to 33 currently unoccupied (non-baseline) spotted owl sites or other currently unoccupied non-baseline lands during and immediately following the course of the experimental removal of barred owls, as defined in the SHA. The actual take and impact of that take is likely to be small because:
 - Not all currently unoccupied spotted owl sites are likely to be reoccupied during the Experiment.

- The Permit would authorize the removal of less than 8 percent of the current spotted owl nesting/roosting habitat in the treatment portion of the Study Area. And some of this removal may not result in take. Removal of small patches of habitat at a distance from the site center of some of these sites may not result in incidental take of the spotted owls in the areas if Federal and other lands have sufficient habitat.
- Disturbance of spotted owl nest sites that may be reoccupied on or in the vicinity of RRC lands or where RRC holds easements and agreements. This take is temporary and limited to the year of the disturbance.
- Spotted owl habitat within treatment portion of the Study Area represents less than 0.08 percent of northern spotted owl habitat range-wide, therefore this will have little effect on the range-wide condition of the species.
- The cumulative effects of incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, does not significantly impact the northern spotted owl because these sites do not currently have spotted owls and would be unlikely to be recolonized without barred owl removal.
- Under the Permit, RRC would be authorized to take spotted owls associated with non-baseline spotted owl sites and areas that may result from the removal of trees on up to 217 acres of CH adjacent to RRC lands. All removal would be in long, narrow, linear segments, with a maximum of approximately 9.2 acres per section (640 acres). This represents less than 0.01 percent of the CH units, and less than 0.002 percent of CH rangewide. This potential loss of CH would not appreciably reduce the conservation value/function of the CH subunit for demographic support of the overall spotted owl population because of the limited and scattered nature of potential tree removal (up to 9.2 acres per section involved), the fact that the vast majority CH habitat within this subunit would remain unaffected, and the distribution of the potential tree removal such that CH loss would not appreciably affect the north-south or east-west connectivity between CH subunits, or its function as a connectivity corridor between the western Cascades, coastal Oregon, and the Klamath Mountains.

Impacts to barred owls from the Experiment were addressed in the FEIS. For the following reasons, the USFWS concludes that the issuance of a Permit allowing incidental take of non-baseline spotted owls resulting from implementation of the RRC SHA will not significantly impact other resources.

- The actual amount of spotted owl habitat that may be affected under this SHA and Permit represents a very small portion of the spotted owl nesting/roosting habitat range-wide. This represents a very small impact on the regional forest environment.
- All covered activities under this SHA could be carried out at any time under current State laws and regulations in the absence of the SHA and Permit because we would be unable to remove barred owls from RRC lands in the treatment portion of the study unit. The

effect of the SHA and Permit would be that the covered activities could occur during the Permit term when, otherwise, they might be delayed until barred owls re-occupy the site after the Experiment has ended.

- The issuance of an incidental take permit only allows take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. (50 CFR 17.3, emphasis added). Thus, issuance of this Permit does not permit any activity that does not conform to Federal and State Laws.

4.0 List of Preparers

This document was prepared by the USFWS, Oregon Fish and Wildlife Office. The following individuals contributed to its preparation.

Name	Affiliation	Responsibility
Paul Henson	U.S. Fish and Wildlife Service, State Supervisor, Oregon Fish and Wildlife Office	Policy oversight and approval
Jody Caicco	U.S. Fish and Wildlife Service, Supervisor, Forest Resource Division, Oregon Fish and Wildlife Office	ESA process and technical oversight
Robin Bown	U.S. Fish and Wildlife Service, Barred Owl Removal Experiment USFWS Project Lead, Oregon Fish and Wildlife Office	Draft EA analysis and preparation, spotted owl expert
Betsy Glenn	U.S. Fish and Wildlife Service, Barred Owl Removal Experiment Team, Oregon Fish and Wildlife Office	Draft EA analysis expert, spotted owl expert

5.0 Coordination

The USFWS conducted extensive scoping and outreach on the EIS for the Barred Owl Removal Experiment (USFWS 2013b, pp. 7-8; 188-193; and 343-350). We established a Barred Owl Stakeholder Group including a broad range of environmental, animal welfare, and industry groups; Federal, State, and local governments; and Native American tribes to assist with early scoping. We conducted public comment periods for scoping and the draft EIS, including one public meeting, five public webinars, and meetings with affected Federal agencies. We mailed notices of the availability of the draft EIS to over 600 individuals and organizations.

We discussed the approach of a SHA for the Barred Owl Removal Experiment with the Private Forest Program of the Oregon Department of Forestry, BLM Districts and National Forests within the study areas included in the Experiment, and with regional offices of the BLM, U.S. Forest Service, and the National Park Service. We have discussed the potential for SHAs with Oregon Department of Forestry and several private landowners within the study areas.

The Amended EA and related documents will be posted on the Service's web site at (<http://www.fws.gov/ofwo/>) and will be made available at the Service's Oregon Fish and Wildlife Office, 2600 SE 98th Ave, Suite 100, Portland, Oregon 97216.

6.0 References

- Buchanan, J.B., R.J. Gutiérrez, R.G. Anthony, T. Cullinan, L.V. Diller, E.D. Forsman, and A.B. Franklin. 2007. A synopsis of suggested approaches to address potential competitive interactions between barred owls (*Strix varia*) and spotted owls (*S. occidentalis*). *Biological Invasions* 9:679-691.
- Davis, Raymond J.; Hollen, Bruce; Hobson, Jeremy; Gower, Julia E.; Keenum, David. 2016. Northwest Forest Plan—the first 20 years (1994-2013): status and trends of northern spotted owl habitats. Gen. Tech. Rep. PNW-GTR-929. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 54 p.
- Dugger, K.M., E.D. Forsman, A.B. Franklin, R.J. Davis, G.C. White, C.J. Schwarz, K.P. Burnham, J.D. Nichols, J.E. Hines, C.B. Yackulic, P.F. Doherty., L. Bailey, D.A. Clark, S.H. Ackers, L.S. Andrews, B. Augustine, B.L. Biswell, J.Blakesley, P.C. Carlson, M.J. Clement, L.V. Diller, E.M. Glenn, A.Green, S.A. Gremel, D.R. Herter, J. M. Higley, J. Hobson, R.B. Horn, K.P. Huyvaert, C. McCafferty, T. McDonald, K. McDonnell, G.S. Olson, J.A. Reid, J. Rockweit, V. Ruiz, J.Saenz, and S.G. Sovern. 2016. The effects of habitat, climate, and Barred Owls on long-term demography of Northern Spotted Owls. *The Condor*: February 2016, Vol. 118, No. 1, pp. 57-116.
- Gutiérrez, R.J., M. Cody, S. Courtney, and A.B. Franklin. 2007. The invasion of barred owls and its potential effect on the spotted owl: a conservation conundrum. *Biological Invasions* 9:181–196.
- Johnson, D.H., G.C. White, A.B. Franklin, L.V. Diller, I. Blackburn, D.J. Pierce, G.S. Olson, J.B. Buchanan, J. Thraikill, B. Woodbridge, and M. Ostwald. 2008. Study designs for barred owl removal experiments to evaluate potential effects on northern spotted owls. Unpublished report, Washington Department of Fish and Wildlife, Olympia.
- RRC Safe Harbor Agreement. 2016. Safe Harbor Agreement for Roseburg Lumber Company in the Union/Myrtle (Klamath) Study Area
- USFWS (U.S. Fish and Wildlife Service). 2011. Revised Recovery Plan for the Spotted Owl (*Strix occidentalis caurina*). U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS (U.S. Fish and Wildlife Service). 2013a. Record of Decision for the Experimental Removal of Barred Owls to Benefit Threatened Spotted Owls. U.S. Fish and Wildlife Service, Portland, Oregon.

USFWS (U.S. Fish and Wildlife Service). 2013b. Final Environmental Impact Statement for the Experimental Removal of Barred Owls to Benefit Threatened Spotted Owls. U.S. Fish and Wildlife Service, Portland, Oregon.