United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Medford District Office
3040 Biddle Road
Medford, Oregon 97504

MAR 29 2011

TAKE PRIDE® IN AMERICA

3/29/11
Dave Roelofs 3/28/11
3/28/11

In Reply Refer to:
6842(ORM050)

Records

Memorandum

To: Field Office Supervisor, Roseburg Office, US Fish and Wildlife Service

From: District Manager, Medford S/ Dayna Barron

Subject: Submission of Medford BLM, Butte Falls RA Evans Creek 2011 LAA BA

This Biological Assessment (BA) evaluates three timber sales (Evans Sardine, Musty Evans, and Skeleton Mountain) that "may affect and are likely to adversely affect" (LAA) northern spotted owls. This BA also evaluates two timber sales (Pleasant Fielder and Slick Battle) and one small diameter thinning project (Evans Stew) that "may affect, but is not likely to adversely affect" (NLAA) northern spotted owls. No effects to current Critical Habitat is anticipated; nor is any other federally listed wildlife species affected by these projects.

Enclosed is the *Medford Bureau of Land Management (BLM), Evans Creek 2011 LAA Biological Assessment* including Appendix A, which lists project design criteria for northern spotted owls; Appendix B, small diameter thinning treatment descriptions; Appendix C, the Owl Estimation Methodology; and Appendix D and E, the Proposed Action Maps.

We request formal consultation from the US Fish and Wildlife Service that evaluates these projects. We look forward to working with the US Fish and Wildlife Service to meet our joint obligations under the Endangered Species Act 7(a) 1 and 7(a) 2.

Enclosures

ORM050:Roelofs:2413:cs:3/24/2011:OP6313TransmittalEvansCkBA LAA April2011

Biological Assessment

for

Evans Creek Projects in the Medford BLM District that May Affect and are Likely to Adversely Affect (LAA) Northern Spotted Owls

(Cite as Medford Evans Creek LAA BA)

An Assessment of Effects to the Northern Spotted Owl

Medford District
Bureau of Land Management
Butte Falls Resource Area
April 2011

Table of Contents

Spring 2011 Biological Assessment for Activities in the Butte Falls RA, Medford BLM District that May Affect and are Likely to Adversely Affect (LAA) Northern Spotted Owls (Cite as Medford Evans Creek LAA BA)

1. Introduction

The Medford District Bureau of Land Management (BLM) is submitting this Biological Assessment (BA) to the US Fish and Wildlife Service (Service) pursuant to Section 7 (a)(2) of the Endangered Species Act (ESA). Section 7 (a)(2) requires Federal agencies to consult with the Service to ensure their actions will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats. Conservation measures described in this BA also meet obligations under Section 7 (a)(1) to conserve habitat.

This Biological Assessment (BA) describes and evaluates the potential effects from six timber sales in the Medford BLM district. All of the timber sales are located in the Butte Falls RA:

- Evans Sardine, Evans Stew, Musty Evans, Pleasant Fielder, Skeleton Mountain, and Slick Battle

BLM requests formal consultation for projects we have determined *may affect, likely to adversely affect (LAA)* the northern spotted owl and concurrence for projects we have determined *may affect, but not likely to adversely affect (NLAA)* the northern spotted owl.

The effects on plants are evaluated in the FY 2009-2013 Programmatic Biological Assessment for Activities that May Affect the listed endangered plant species Gentner's Fritillary, Cook's Lomatium, McDonald's rockcress, and large-flowered wooly meadowfoam (USDI 2008a). Listed fish are evaluated in separate project level consultations. No other listed species or designated critical habitat will be affected by the activities identified in this BA.

1.1 Consultation History

Lawsuits on ESA consultation for the northern spotted owl have resulted in withdrawn consultation documents and consequently in the need to reinitiate consultation. Four timber sale actions included in this Proposed Action were originally analyzed in previous BAs prepared by the Medford BLM (Table 1). This is the first consultation for the remaining two projects.

Table 1. Consultation History of Proposed Harvest Projects

Project	BA FY 04-08	BA FY 06-08	BA DA BA FH	07 NLAA	Name of original project (if sale was previously consulted under another name)
Evans Sardine	X	X	X	X	
Musty Evans		X	X		
Pleasant Fielder	X	X	X		Pleasant Fry, Fielder Mountain
Slick Battle	X	X	X	X	Slick Sand

Pleasant Fielder, Evans Sardine, and Slick Battle timber sales were originally consulted on programmatically in a combined Forest Service and Medford BLM BA covering forest management activities planned for 2004-2008 (USDA and USDI 2003). The Service issued a Biological Opinion (BO) for these projects in 2003 (FWS Log #1-15-03-F-511). In response to the Ninth Circuit opinion in NEDC v. Allen/USFWS (NEDC I), No. 05-1279 (D. Or.), the Service sent a letter on November 2, 2005, recommending the Forest Service and the Medford BLM reinitiate and reevaluate critical habitat impacts using critical habitat definitions of the ESA, rather than the Service's regulations (50 CFR Part 402).

Musty Evans timber sale was added to the Biological Assessment in the Medford BLM District's Biological Assessment for FY2006-2008 Projects (USDI 2006). The BLM received a BO (FWS Log# 1-15-06-F-162) and a separate Letter of Concurrence (LOC) (FWS Log#1-155-06-I-0165) from the FWS in August 2006. In response to the Ninth Circuit opinion in ONRC v. Allen, No. 05-35830 (9th Cir.), the Service withdrew several BOs and LOCs in March 2007, including FWS Log# 1-15-06-F-162 and FWS Log#1-155-06-I-0165 and requested reinitiation of ESA section 7 consultation.

The BLM reinitiated consultation on the Not Likely to Adversely Affect (NLAA) fuels treatments associated with these projects analyzed in the FWS Log#1-155-06-I-0165 LOC and received an LOC from the Service (Tails # 13420-2007-I-0231).

In October 2008, the BLM submitted a reinitiated programmatic BA for LAA projects in *District Analysis and Biological Assessment of Forest Habitat, DA BA FH* (USDI 2008b). A separate reinitiated BA for NLAA vegetation treatments originally analyzed in DA BA FH was submitted to the Service and the BLM received an LOC in 2009 (Tails #1342-2009-I-0093). On March 5, 2010, the Service sent BLM a memo requesting the District revise the 2008 DA BA FH due to changes in the proposed action.

Evans Sardine, Musty Evans, Pleasant Fielder, and Slick Battle projects were put on hold in 2008 as attention and resources shifted toward salvaging wind-blown trees on the east side of the Butte Falls Resource Area.

Within three fifth field watersheds, the Evans Sardine, Evans Stew, Musty Evans, Pleasant Fielder, Skeleton Mountain, and Slick Battle projects were presented to the Roseburg US Fish and Wildlife Service (USFWS) and Level 1 team biologists at a meeting on January 14, 2011. The Level 1 team includes the Rogue River-Siskiyou National Forest Biologist, the Medford BLM District Biologist, and the Roseburg USFWS Biologist. The Level 1 team reviewed a draft of this BA on March 1, 2011.

This BA is in conformance with, and incorporates by reference, the 1995 Medford District Resource Management Plan (USDI 1995) and the Northwest Forest Plan (USDA USDI 1994a).

1.2 Northern Spotted Owl Recovery Plan

On May 16, 2008, the USFWS released a recovery plan for the northern spotted owl that identified criteria and actions to allow for the recovery of the northern spotted owl (USDI USFWS 2008). On March 31, 2009, the USFWS advised the court that they intended to seek a

remand of both the northern spotted owl recovery plan and critical habitat revision and they would file a motion concerning the terms of such remand after consultation and negotiation with the parties. At a Court status hearing on April 21, 2009, the Defendants requested permission, and the Court subsequently ordered the filing of the motion, for remand by June 1, 2009. On July 16, 2009, the Assistant Secretary for Fish, Wildlife and Parks announced that the Federal government would conduct a thorough review of the Recovery Plan prior to its full implementation.

On September 8, 2010, the USFWS released the *Draft Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*)* for public comment. The plan is currently under review and has not been finalized. The draft plan recommends retaining all occupied spotted owl sites as well as high quality habitat (RA 32). The plan provides guidance to bring about recovery through prescribed management actions and supplies criteria to determine when recovery has been achieved.

Recovery plans are not regulatory documents; rather, they provide guidance to bring about recovery and establish criteria to be used in evaluating when recovery has been achieved. The BLM continues to work with the USFWS to incorporate Recovery Goals and Actions consistent with BLM laws and regulations. The BLM is a participant in the inter-organizational spotted owl working group (Recovery Action 1) and will continue demographic monitoring to address Recovery Actions 2 and 3.

The BLM is also a collaborator in many of the Recovery Actions that address barred owl issues, such as Recovery Action 32 (RA 32). The intent of RA 32 is to maintain all of the older and more structurally complex multi-layered conifer forests on Federal lands in order not to further exacerbate the competitive interactions between spotted owls and barred owls. Within the administrative units of the Rogue River-Siskiyou National Forest and the Medford District BLM, an interagency, interdisciplinary team was created to develop a methodology for identifying Recovery Action 32 structurally complex forest. It will be used for project level planning and northern spotted owl consultation needs in southwestern Oregon. The most current methodology (version 1.3, January, 2010) was used for this consultation to identify RA 32 stands.

1.3 Definitions

1.3.1 NW Forest Plan Land Use Allocations (USDA and USDI 1994b)

KSOACs (Known Spotted Owl Activity Centers)/100-acre Cores are the best 100 acres around northern spotted owl activity centers that were documented as of January 1, 1994 on Matrix and AMA lands, and are managed as Late Successional Reserves (LSR). The criteria for mapping these areas are identified on pages C-10 and C-11 of the Northwest Forest Plan Standards and Guidelines (USDA USDI 1994b).

Matrix lands are Federal lands outside of reserves and special management areas that are available for timber harvest at varying levels (USDI 1995, 107). Matrix includes north and south General Forest Management Areas (NGFMA and SGFMA). Green tree retention ranges from 6 to 25 trees per acre following regeneration harvest in Matrix lands (USDI 1995, 38-39).

1.3.2 Northern Spotted Owl Occupancy

Active Spotted Owl Sites are defined as locations with evidence of continued use by spotted owls, including breeding, repeated location of a pair or single birds during a single season or over several years, presence of young before dispersal, or some other strong indication of continued occupation. A spotted owl site may include one or more alternate nest sites.

Unoccupied Spotted Owl Sites are defined as historic sites that once were active, but a long history of surveys have demonstrated spotted owls no longer occupy them.

Documented Spotted Owl Sites referred to in this analysis include both active and unoccupied owl sites. Documented spotted owl sites are tracked in the BLM northern spotted owl database.

Generated ("G") Sites are estimated locations of spotted owl activity centers created by the use of a methodology developed by an interagency team to estimate the number of northern spotted owl home ranges that are likely to occur in unsurveyed habitat within the area affected by a proposed action. Generated sites are based on the amount and distribution of suitable owl habitat (on Federal and non-Federal land) and best available information on known owl locations and spacing patterns for that area. The methodology relies upon known spotted owl locations derived from surveys as the foundation for a "northern spotted owl occupancy" map (NSOOM) (USDI *et al.* 2008). Generated sites, for the purpose of this analysis, will be identified as "active" if surveys have determined the presence of owls.

Provincial Home Range is defined, for analysis purposes in this document, by a circle located around an activity center and represents the area owls are assumed to use for nesting and foraging in any given year. Provincial home range radii (provincial radius) vary based on the physiographic province in which they are located: Klamath Mountains Province = 1.3 miles (3,396 acres), and Western Cascades Province = 1.2 miles (2,893 acres). The provincial home ranges of several owl pairs may overlap.

Core Area is a 0.5-mile radius circle (approximately 500 acres) from the nest or center of activity to delineate the area most heavily used by spotted owls during the nesting season; it is

included in the provincial home range circle. Core areas represent the areas that are defended by territorial owls and generally do not overlap the core areas of other owl pairs (USDI *et al.* 2008).

Nest Patch is the 300-meter radius (70 acres) around a known or likely nest site; it is included in the core area (USDI *et al.* 2008).

1.3.3 Owl Activity Periods

Table 2 displays the spotted owl breeding periods used to determine effects in this biological assessment.

Table 2. Northern Spotted Owl Breeding Periods

Entire Breeding Period	Critical Breeding Period	Extended Breeding Period
March 1-September 30	March 1-June 30	July 1-September 30

1.3.4 Northern Spotted Owl Habitat

BLM lands are assigned into four categories of forestland in this BA. These categories are distinct and not over-lapping.

- NRF (Nesting, Roosting and Foraging)
  - RA 32 High Quality
- Dispersal-only
- Capable
- Non-habitat

Nesting, Roosting, and Foraging (NRF) Habitat for the northern spotted owl consists of habitat used by owls for nesting, roosting, and foraging. Generally, this habitat is multistoried, 80 years old or older (depending on stand type and structural condition), and has sufficient snags and down wood to provide opportunities for nesting, roosting, and foraging. The canopy closure generally exceeds 60 percent, but canopy closure or age alone does not qualify a stand as NRF. Other attributes include a high incidence of large trees with various deformities (e.g. large cavities, broken tops, mistletoe infestations, and other evidence of decadence), large snags, large accumulations of fallen trees and other woody debris on the ground, and sufficient open space below the canopy for owls to fly (Thomas *et al.* 1990). In southwest Oregon, NRF habitat varies greatly, but is typified by mixed-conifer habitat, recurrent fire history, patchy habitat components, and a higher incidence of woodrats (a high quality spotted owl prey species). It may consist of somewhat smaller tree sizes. One or more important habitat components, such as dead down wood, snags, dense canopy, multistoried stands, or mid-canopy habitat, might be lacking or even absent in portions of southwest Oregon NRF. NRF habitat also functions as dispersal habitat.

RA 32 High Quality Habitat is older, multi-layered, structurally complex forests that are characterized as having 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 NRF habitat and may vary due to climatic gradients across the range (USDI FWS 2010).

Dispersal Habitat is a subcategory of "all dispersal" habitat for northern spotted owls. All-dispersal is defined as dispersal plus NRF. Throughout this document, "dispersal" will be used to describe dispersal-only habitat. Thomas *et al.*, 1990, defined dispersal habitat as forested habitat more than 40 years old, with canopy closure more than 40 percent, average diameter greater than 11 inches, and flying space for owls in the understory and does not provide the components found in NRF. It provides temporary shelter for owls moving through the area between NRF habitats and some opportunity for owls to find prey; but it does not provide all of the requirements to support an owl throughout its life. Dispersal will be used throughout this document to refer to habitat that does not meet the criteria to be NRF habitat, but has adequate cover to facilitate movement between blocks of NRF habitat.

Capable Habitat for the northern spotted owl is forestland that is currently not habitat but can become NRF or dispersal in the future, as trees mature and canopy fills in.

Non-habitat does not provide habitat for northern spotted owls and will not develop into NRF or dispersal in the future.

1.3.5 Spotted Owl Habitat Modification

Treat and Maintain NRF or Dispersal Habitat means an action or activity will occur within NRF or dispersal habitat but will not change the conditions that would classify the stand as NRF or dispersal post-treatment. The NRF stand will retain at least 60 percent canopy cover, large trees, multistoried canopy, standing and down dead wood, diverse understory adequate to support prey, and may have some mistletoe or other decay. Dispersal habitat will retain at least 40 percent canopy, flying space, and trees 11 inches diameter at breast height (DBH) or greater, on average. The habitat classification of the stand following treatment will be the same as the pretreatment habitat classification.

Downgrade Habitat means to alter the function of spotted owl NRF habitat so the habitat no longer supports nesting, roosting, and foraging behavior. Downgraded NRF habitat has enough tree cover to support spotted owl dispersal.

Remove Habitat

No habitat removal would occur under the proposed actions.

1.3.6 Spotted Owl Designated Critical Habitat

Final rule for revised designation of critical habitat for the northern spotted owl was published by the USFWS in the *Federal Register* and signed on August 12, 2008 (73 Federal Register 157:47326) and became effective on September 12, 2008.

Critical Habitat includes the primary constituent elements that support nesting, roosting, foraging, and dispersal. Designated critical habitat also includes forestland that is currently unsuitable, but has the capability of becoming NRF habitat in the future (57 FR 10:1796-1837).

None of the projects in this BA are within 2008 CHU.

2. Description of the Proposed Action

The BA describes and evaluates the potential effects from five timber sales and one small diameter thinning (stewardship) project in the Medford BLM District, Butte Falls Resource Area, on the northern spotted owl (*Strix occidentalis caurina*). All projects will occur on matrix lands within the range of the spotted owl. None of the projects occur within 2008 Designated Critical Habitat, 100-acre activity centers, or LSR.

This BA uses the fifth field (HUC 5) watershed scale (hydrologically defined units) for the Environmental Baseline. The ownership within these watersheds occurs in a checkerboard pattern of mixed private and Federal ownership, and not all of these lands are capable of providing spotted owl habitat.

The projects are scattered across three fifth field watersheds (Table 4) and two spotted owl physiographic provinces: Klamath Mountains and Western Cascades.

We expect the projects to be implemented soon after the BO is received and National Environmental Policy Act (NEPA) compliance is completed; projects would be implemented in FY 2011, 2012, 2013, or 2014. BLM defines implementation of timber sales as the date a project is sold. Harvest activities could take up to five years to complete, however. Once a sale is sold, purchasers usually have three years to implement (harvest) the sale, but contracts can be extended for seasonal clearances and other reasons. Purchasers have the option to log the entire sale in one season or they may log portions of the sale in different years.

All units will receive post harvest fuels treatments to reduce potential increases in fuel hazard due to the buildup of harvest generated slash and residual small high density trees, as needed. These fuels treatments will include selective slashing/hand pile burning, and underburning within the first two years of harvest. Follow-up maintenance underburns may occur 4-10 years post-harvest within the Wildland Urban Interface (WUI) to maintain a Fire Regime Condition Class (FRCC) of one or two. The fuels treatments would occur only within the footprint of the proposed harvest units.

The Medford BLM anticipates the projects analyzed in this BA will be completed within a 10-year timeframe from the date of the BO. This timeline may be less if significant new science, litigation, or changes in effects, as determined through the Level 1/Level 2 team process, triggers reinitiation.

2.1 Description of the Action Area

The Action Area is defined as "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)." For this consultation, the Action Area includes all proposed harvest units and a distance of 1.3 miles (provincial home range) out from the boundaries of all proposed project units, as well as all areas subject to increased ambient noise levels caused by activities associated with the proposed action. Affects to northern spotted owl habitat were analyzed in three fifth field watersheds (Evans Creek, Trail Creek, and Upper Cow) containing proposed harvest units.

2.2 Description of the Treatment Types

2.2.1 TIMBER HARVEST

Dry forest restoration (DFR)

The objective of forest restoration is to increase landscape resiliency to environmental disturbances (i.e. fire, insects, disease, and climate change). Removing smaller trees and vegetation that compete with the dominant and co-dominant trees for nutrients and water would reduce stand densities. All trees 150 years or older and all of the largest hardwoods would be retained. Leaving small un-thinned patches and creating small openings would achieve structural diversity within stands. Un-thinned patches and modified small openings would range in size from .1 to .25 acres and occupy 10-15% of the stand acreage.

Treatment acres would have a minimum of 60 percent canopy closure left in NRF habitat in active home ranges of northern spotted owls, while existing snags and course woody material (CWD) would be retained. Snags that have to be felled for safety reasons would be left on site for CWD. Prescribed burning would be avoided in treat and maintain NRF acres. Outside of the active home ranges of the spotted owl, a minimum of 40 percent canopy closure would be reserved within treated stands. Generated sites, for the purpose of this analysis, will be identified as "active" if surveys have determined the presence of owls (see Definitions Section 1.3.2).

2.2.2 FUELS REDUCTION within Proposed Harvest Units

Selective Slashing means reducing understory vegetation density by cutting and spacing of conifers <8 inches DBH and hardwoods <12 inches DBH. Retained vegetation would be spaced 14-45 feet apart. Untreated vegetation groups ranging in size from 0.1 to 2 acres would be retained in each treatment unit.

Hand piling and burning is typically used when underburning is not possible due to heavy fuel loads. Sticks 1 inches to 6 inches diameter and longer than two feet would be piled by hand. Hand piling and burning would decrease fuel loading of material 1 to 6 inches in diameter by 85 to 95 percent. Fuels greater than 6 inches in diameter would be left on the surface and would contribute to the coarse woody debris load. This treatment would move stands from a slash fuel type into a timber fuel type, which would result in a reduced rate of fire spread and average flame length.

Understory Burning (underburning) is used where the objective is to maintain ≥80 percent of the overstory. Typically, burning occurs between fall and spring outside of Project Design Criteria (PDC). Approximately ten (10%) percent of all treatment acres may be prescribed underburned to reduce the fuel loading and/or maintain the stands in a desired condition.

2.2.3 SMALL DIAMETER THINNING (STEWARDSHIP)

Prescriptions will vary depending on stand type and age, relative density, canopy cover, and location on the landscape (Appendix B). Tree removal consists of young, small-diameter trees.

2.3 Description of the Projects

The proposed actions for all Evans Creek projects are summarized in Table 4.

2.3.1 Purpose and Design of the projects

The Evans Creek preferred alternative emphasizes dry forest restoration treatments as described in the *Restoration of Federal Forests in the Pacific Northwest: Strategies and Management Implications* (Johnson and Franklin 2009). The preferred alternative would maintain current owl habitat status within all high quality habitat as determined by the Relative Habitat Suitability (MaxEnt) modeling described in the *2010 Draft Revised Recovery Plan for the Northern Spotted Owl* (USDI FWS 2010). Treatments proposed would maintain identified high quality habitat (a value of 35 and above in the raster dataset), along with NRF and dispersal habitat, within the 500 acre owl core area of documented spotted owl sites. No habitat would be downgraded or removed within active home ranges. No RA 32 habitat would be treated.

The underlying purpose of these projects is to provide a sustainable supply of timber and forest products while concurrently managing for a healthy forest ecosystem. All projects are within matrix lands, which are identified in the NWFP as lands available for timber harvest. Harvest would be accomplished using a combination of cable and tractor systems. All treatment units will meet NWFP and Medford RMP snag and coarse woody material (CWD) guidelines.

In January 2010, the Rogue River-Siskiyou National Forest supervisor and BLM Medford District manager approved the use of the Recovery Action 32 (RA 32) Habitat Evaluation Methodology 1.3. It complies with the *2010 Draft Revised Recovery Plan for the Northern Spotted Owl* recommendation in RA 32 to maintain all of the older and more structurally complex, multi-layered conifer forests. The methodology was used to determine the presence or absence of highly suitable, structurally complex, spotted owl habitat in all project units under consideration in this analysis.

These projects have been designed to avoid older and more structurally complex, multi-layered conifer forests (RA 32). Approximately 0.2 miles of road renovation is proposed on an existing roadbed through an RA 32 stand (see affects to NRF, section 4.3.4).

Road maintenance will occur with existing roads being graded, brushed, culverts repaired, water bars placed or repaired. Some hazard tree removal may be needed.

2.3.2 Proposed Action Summary

All project acres presented in this BA are from GIS planning-level shape files (overlay maps) and associated attribute files. There may be minor deviations in the description of projects. Consultation will be reinitiated if the scope of the project expands to include effects greater than those consulted on under this BA or if the projects cannot be revised to comply with this consultation.

Table 4. Proposed Action Summary

Project	Province	EA #	Total Project Acres (In BA)	2008 CHU*	Treatment Type	New Road Building (miles)	RA 32**	
							Habitat Dropped from Harvest (Acres)	RA 32 Treated (Acres)
EVANS CREEK FIFTH FIELD WATERSHED								
Evans Sardine	Klamath	OR-M050-2010-0019	198	No	Timber DFR	0	184	0
Evans Stew	Klamath		1,140	No	Stewardship 1 - 9	0	64	0
Musty Evans	Western Cascades		84	No	Timber DFR	0	84	0
Musty Evans	Klamath		406	No	Timber DFR	0.2	102	0
Pleasant Fielder	Klamath		267	No	Timber DFR	0	260	0
Skeleton Mountain	Klamath		765	No	Timber DFR	0	136	0
Slick Battle	Klamath		268	No	Timber DFR	0	215	0
TRAIL CREEK FIFTH FIELD WATERSHED								
Musty Evans	Western Cascades	OR-M050-2010-0019	24	No	Timber DFR	0	0	0
Musty Evans	Klamath		10	No	Timber DFR	0	28	0
UPPER COW CREEK FIFTH FIELD WATERSHED								
Musty Evans	Klamath	OR-M050-2010-0019	124	No	Timber DFR	0	0	0
Skeleton Mountain	Klamath		14	No	Timber DFR	0	23	0
Totals			**3,300**			**0.2**	**1,096**	**0**

* Critical Habitat Unit

**RA 32 acres identified from field evaluations

2.4 Project Design Criteria

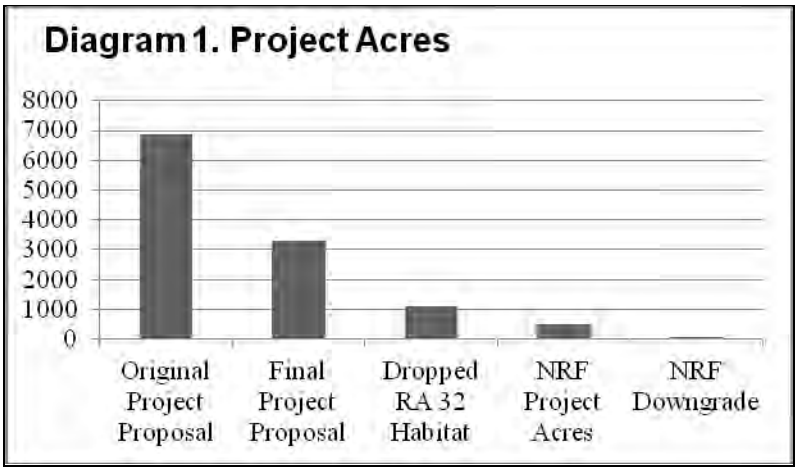
Project Design Criteria (PDC) are conservation measures developed to reduce disturbance impacts to listed species (see Appendix A). Disturbance of listed wildlife species occurs when noise, smoke, vibration, or visual stimuli cause impairment of normal behavior. Mandatory PDC are measures applied to project activities designed to avoid the potential adverse disturbance effects to nesting birds and their young. Mandatory PDC will be incorporated into all activities as integral to the Proposed Action. PDC involving seasonal restrictions will be implemented unless surveys, following approved protocols, indicate either non-occupancy or non-nesting of target species. Recommended PDC will be incorporated during project implementation when practical. If recommended PDC cannot be incorporated, the project will still be in compliance with this BA.

2.5 Conservation Measures

The development of the Evans Creek projects over the past several years involved:

- Spotted owl habitat assessments
- Red tree vole, mollusk, great gray owl, and spotted owl surveys
- Sensitive plant surveys
- Historic owl survey data assessments
- Tracking locations and nesting success of banded spotted owls
- Tree stand exams
- Identification of fragile soils

The final proposed size of the project was divided in half after all assessments and buffers were determined. Diagram 1 compares original proposed project acres with final project acres.



Project development and stand treatments revolved around trying to avoid adversely affecting spotted owls. Careful attention was focused toward avoiding the downgrade and removal of habitat within the home ranges of active or occupied owl sites. Owl surveys were conducted to learn the occupancy status of areas that had little or no survey history. Highly suitable/ RA 32 habitat was identified in the field and dropped from treatment. Proposed hazardous fuel

reduction under-burning will be directed toward dispersal-only and capable habitat to avoid the reduction of woody material in NRF-maintained units.

Active red tree vole nests, sensitive plant sites, riparian zones, great gray owl nests, and mine adits with bat habitat, were all buffered and removed from treatment. These sensitive areas will continue to provide dispersal corridors, foraging habitat, and nesting and roosting opportunities for owls.

Stands of young trees that are currently marginal dispersal habitat or capable habitat will be thinned to encourage the growth of the remaining, older trees, and to reduce the danger of stand-replacing fires. Retaining patches of older hardwood and pine trees in all units will provide fire resiliency to the watersheds. Reducing the fire danger around known owl home ranges will buffer them from large fire occurrences possible in the dry, Klamath Province. Retaining all trees 150 years and older will provide for future owl nesting opportunities (EA #M050-2010-0019, Section 3.7).

3. Environmental Baseline

Regulations implementing Section 7 of the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the Action Area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the Action Area that have undergone Section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress. Such actions include, but are not limited to, previous timber harvests and other land management activities.

A detailed account of the taxonomy, ecology, and reproductive characteristics of the spotted owl can be found in the *2010 Draft Revised Recovery Plan for the Northern Spotted Owl* (USDI FWS 2010), the SEI 2004 northern spotted owl status review (Courtney *et al.* 2004); the Interagency Scientific Committee Report (Thomas *et al.* 1990); Forest Service Ecosystem Management Report (USDA *et al.* 1993), final rule designating the spotted owl as a threatened species (1990), and several key monographs (e.g., Anthony *et al.* 2004 and Forsman *et al.* 2004).

3.1 Status of Northern Spotted Owl Habitat in the Action Area

This Environmental Baseline for owls on the Medford BLM administered lands for the Action Area is current as of February 2011. The Baseline was developed using existing information, field assessments by experienced wildlife biologists, Interagency Vegetation Mapping Project (IVMP) imagery from 1996 (as corrected through 2003), and several additional steps of refinements. This was also the source for information for non-BLM Federal lands. Much of the forested habitat in the Medford BLM is mixed-age, mixed-conifer habitat, which makes it difficult to delineate listed species habitat using traditional photo or satellite imagery or by depending solely on data from the Forest Operations Inventory (FOI), the BLM silvicultural data system. The Environmental Baseline update incorporated photos, field information, and FOI data into the IVMP environmental baseline update. Field verified information was used for

effects determinations for each project and for geographic information system (GIS) shapefile attributes.

The Environmental Baseline was corrected to match the field-evaluated habitat used for project shapefiles when necessary. Some slight modifications were incorporated in this BA as a result of field verifications during the planning process and corrections in the database unit boundaries. The Baseline was also updated following harvest activities on BLM-managed lands. Timber harvest and forest fires on both Federal and private lands have contributed to the current condition reflected in the Environmental Baseline.

The proposed projects are within the Klamath Province in southwestern Oregon where fire is recognized as a key natural disturbance (Atzet and Wheeler 1982). Fire has played an important role in influencing successional processes and creating diverse forest conditions. Approximately 110 acres of the Musty Evans timber sale are within the Western Cascades Province. Within the Western Cascades Province, historical fire frequencies that are low or moderate in the northern part of the province are higher in the south (Moeur *et al.* 2005).

Spotted owl habitat patterns in these drier portions of its range are not continuous, but occurred naturally in a mosaic pattern (USDI FWS 2008). The mosaic pattern described was a direct result of natural fire regimes. Agee (1993, 2003) and Hessburg and Agee (2003) characterized the historical wildfire regime as low- to mixed-severity with fire return intervals of less than 10 to 50 or more years, depending on local conditions.

Table 5 summarizes Federal and private ownership, as well as spotted owl habitat for the affected watersheds.

Table 5. Environmental Baseline for the Action Area (Fifth Field Watersheds)

Evans Creek	Acres
Total acres all ownership	143,278
Total acres Non-Medford BLM ownership	84,013
Total acres Medford BLM	59,265
Non-habitat	823
Capable	17,957
Dispersal	14,066
NRF	26,420
Total NRF on Non-Medford BLM ownership	21,894
Other Federal NRF	618
Non-Federal NRF	21,276
Trail Creek	**Acres**
Total acres all ownership	35,309
Total acres Non-Medford BLM ownership	20,449

Total acres Medford BLM	14,860
Non-habitat	796
Capable	3,191
Dispersal	2,598
NRF	8,275
Total NRF on Non-Medford BLM ownership	7,045
Other Federal NRF	2,081
Non-Federal NRF	4,964
Upper Cow Creek	Acres
Total acres all ownership	47,436
Total acres Non-Medford BLM ownership	37,771
Total acres Medford BLM	9,665
Non-habitat	502
Capable	2,780
Dispersal	1,089
NRF	5,294
Total NRF on Non-Medford BLM ownership	24,469
Other Federal NRF	17,428
Non-Federal NRF	7,041

3.2 Status of Northern Spotted Owl Sites in the Action Area

Spotted owl sites used in this BA are based on historic information, protocol surveys, incidental observations, or computer generated sites as discussed in the Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions (USDI *et al.* 2008).

The numbers of spotted owl sites (active, generated, and unoccupied) that are associated with the Action Area are summarized in Table 6 by watershed.

Table 6. Spotted Owl Sites (by Fifth Field Watershed and Action Area)

Watershed	Number of known owl sites (centers) within Watershed boundary *	Number of owl home ranges Associated with the Action Area		
		Active	Generated	Unoccupied
Evans Creek	50	33	9	17
Trail Creek	10	2	0	0
Upper Cow Creek	9	1	2	0

* This number represents primarily BLM sites and adjacent Forest Service sites. There are likely more owl sites on FS lands not included in this number.

Limited surveys have been conducted at some of these sites in the past decade, but survey history for every site within the Action Area is available. Since the existing survey coverage and effort are insufficient to produce reliable estimates of population size at the district level, demographic data are used to evaluate trends in spotted owl populations (USDI USFWS 2008).

The proposed projects are located in the Klamath Mountains Province except for approximately 108 acres that are located in the Western Cascades Province. According the 2004 Status and Trends in Demography of Northern Spotted Owls report, populations in the Klamath Demography study area (which represents the Klamath Mountain Province) and Southern Oregon Cascades study area (which represents the Western Cascades Province) were stable at the time when the meta-analysis was conducted (Anthony *et al.* 2006).

The data from all of the demographic study areas located across the range of the spotted owl were analyzed again in 2009. This document is in press, but initial reports indicate populations of northern spotted owls are declining across the range and in all study areas (Forsman *et al.*, in press). Specific information for the Klamath and Southern Oregon Cascades Demography Study areas will be available when the report is released.

3.3 Barred Owls

The *2010 Draft Revised Recovery Plan for the Northern Spotted Owl* identifies competition from the barred owl as a threat to the spotted owl (USDI FWS 2010). Barred owls (*Strix varia*) are native to eastern North America, but have moved west into spotted owl habitat. Since barred owls are less selective about the habitat they use and the prey they feed on, they may be out-competing northern spotted owls for habitat and food. The effects of the barred owl on spotted owl survival and reproduction is unknown. Barred owls are detected opportunistically. There is a trend of increasing numbers of barred owls within the Medford District. Barred owls have been observed in and near the Action Area. During spotted owl surveys in the past four years, barred owls were detected at six spotted owl sites in the Action Area.

4. Effects of the Proposed Action

The projects analyzed in this BA "may affect and are likely to adversely affect" (LAA) spotted owls due to downgrading of NRF habitat to dispersal habitat. The projects that propose "treat and maintain" prescriptions "may affect, but are not likely to adversely affect" (NLAA) spotted owls because there would be no loss of habitat within them. There is No Effect (NE) to 2008 critical habitat because none of the projects occur within any 2008 designated CHUs. No other ESA listed terrestrial wildlife species are affected by the proposed action.

The proposed action may impact the northern spotted owl in a variety of ways and at differing levels depending on exactly where and when the activity occurs. All effects from the proposed action have been evaluated in this assessment, including effects from activities that are interdependent or interrelated.

In the long-term, thinning treatments will help improve the ecological health of tree stands. Restoring the health and vigor of the remaining trees will be accomplished by reducing stand densities and competition (Newton *et al.* 1987). Removal of the smaller diameter trees within a stand allow larger, healthier trees to continue to grow; reduce the chance of tree loss in overstocked stands from suppression mortality; and reduce the intensity and risk of wildfire by removing excess fuels (Main *et al.* 1996) (Latham *et al.* 2002).

4.1 Effects to Habitat

We describe potential effects of habitat change as compared to the current environmental baseline. The effects to NRF and dispersal habitat are summarized in Tables 7 and 8.

4.1.1 Effects to NRF

Table 7. Effects to NRF by Fifth Field Watershed from proposed projects (BLM ownership)

Project	NRF Acres					
	Pre-Project	NRF Maintained	NRF Removed	NRF Downgraded	Post-Project	% Changed
Evans Creek						
Evans Sardine		11	0	11		
Evans Stew		0	0	0		
Musty Evans		13	0	4		
Pleasant Fielder		9	0	0		
Skeleton Mountain		259	0	40		
Slick Battle		128	0	0		
Evans Creek Total	**48,313**	**420**	**0**	**55**	**48,258**	**-0.1**
Trail Creek						
Musty Evans		6	0	0		
Trail Creek Total	**15,321**	**6**	**0**	**0**	**15,321**	**0**
Upper Cow Creek						
Musty Evans		0	0	0		
Skeleton Mountain		15	0	0		
Upper Cow Total	**29,764**	**15**	**0**	**0**	**29,764**	**0**
Totals						
	Total Pre-Project	**NRF Maintained**	**NRF Removed**	**NRF Downgraded**	**Total Post-Project**	**Total % Change**
Total	**93,398**	**441**	**0**	**55**	**93,343**	**0**

The BLM has determined the downgrading of NRF habitat associated with these projects is likely to adversely affect (LAA) northern spotted owls because:

- Thinning that downgrades suitable NRF habitat to dispersal habitat would remove key habitat elements (high percent of canopy cover, multiple canopy layers, and hunting perches), but to a smaller degree because more of the original stand remains intact.

- The removal of these key habitat features would reduce the nesting, roosting, and foraging opportunities for owls within the Action Area, and may lead to increased predation risk by exposing owls to other raptors.

- Downgrading of NRF to dispersal would reduce the amount of existing NRF slightly in one watershed by 0.1 percent.

Thinned stands are expected to return to NRF habitat much more rapidly in comparison to stands treated with a regeneration harvest prescription because more of the key habitat features are retained after a typical thinning operation (Zabel *et al.* 1992, Davis *et al.* 2007

This small loss would not preclude owls from nesting within these watersheds in the future because the proposed treatments are relatively small and are dispersed throughout three watersheds. The proposed actions were designed to avoid NRF habitat removal in nest patches and core areas of all historic sites within the Action Area. Between 99.9 and 100 percent of the existing BLM-managed NRF habitat within each watershed would still be available post-harvest and would continue to provide nesting habitat for spotted owls.

Approximately 1,100 acres of RA 32 stands were identified in the planning process. Retaining these stands may contribute to future expansion of the owl population and provide sanctuary from barred owls.

Stands identified for thinning will have smaller, less vigorous trees harvested. Thinning will reduce the number of trees to levels that the site has water and nutrients to sustain. Thinning increases average stem diameter, crown width, and tree growth rate, and enhances overall tree vigor (Hann 2003). Thinning and prescribed fire can reduce surface fuels, reduce crown density, and manage surface fuels to increase the likelihood that the stand can withstand a wildfire (Agee and Skinner 2005).

The BLM has determined the treating and maintaining of NRF habitat associated with these projects may affect, but is not likely to adversely affect (NLAA) northern spotted owls because:

- Thinning that maintains suitable NRF habitat would not remove key habitat elements (at least 60 percent canopy cover, multiple canopy layers, CWM, and hunting perches).

- All trees 150 years and older would be retained and would provide for nesting opportunities and hunting perches for owls.

- Treating and maintaining NRF would not reduce the amount of NRF habitat within each watershed.

Dry forest restoration (Johnson and Franklin, 2009) would reduce stand density, retain old trees (> 150 years), favor drought tolerant species, provide structural complexity (un-thinned patches and small openings), and increase average stand diameter. These characteristics would increase stand resiliency to environmental disturbances (i.e. fire, insects, disease, and climate change). Treatments designed to maintain approximately 440 acres of NRF habitat would retain a minimum of 60 percent canopy closure.

4.1.2 Effects to Dispersal

Table 8. Effects to Dispersal by Fifth Field Watershed (BLM Ownership)

Project	Dispersal					
	Pre-Project	Dispersal Removed	Dispersal Added **	Dispersal Maintained	Post-Project	% changed
Evans Creek						
Evans Sardine		0	11	178		
Evans Stew		0	0	624		
Musty Evans		0	4	421		
Pleasant Fielder		0	0	259		
Skeleton Mountain		0	40	432		
Slick Battle		0	0	82		
Evans Creek Total	**14,066**	**0**	**55**	**1,996**	**14,121**	**+0.4**
Trail Creek						
Musty Evans		0	0	26		
Trail Creek Total	**2,598**	**0**	**0**	**26**	**2,598**	**0**
Upper Cow Creek						
Musty Evans		0	0	113		
Skeleton Mountain		0	0	19		
Upper Cow Total	1,089	0	0	132	1,089	0
Total	**17,753**	**0**	**55**	**2,154**	**17,698**	**+0.3**

* NRF downgrade increases dispersal-only acres.

The BLM has determined that the thinning of dispersal habitat associated with these projects may affect, but is not likely to adversely affect (NLAA), northern spotted owls. The action may affect spotted owl dispersal by thinning and maintaining 2,154 acres of dispersal habitat. These treatment acres would be expected to continue to provide dispersal opportunities post-treatment and may improve the flying space of the post-treatment dispersal. Total canopy closure would be maintained at 40 percent or more within these stands. Approximately 0.2 miles of new road construction is proposed within dispersal habitat, 0.1 of which is located within the proposed timber harvest unit. The proposed new road is completely outside of any documented and generated owl site.

Since dispersal habitat is widely distributed and abundant throughout the Action Area, the Medford BLM determines that changes to dispersal habitat outside CHU is not likely to adversely affect dispersal for the following reasons:

- There is no loss of dispersal in any fifth field watershed. There would be a gain of between 0 and 0.4 percent of dispersal-only habitat in the watersheds.
- The proposed treatments will be dispersed throughout the watersheds to minimize the potential for adversely affecting spotted owl dispersal because NRF downgrade retains dispersal qualities.
- The treatments would make the residual habitat more ecologically sustainable over time.

The BLM has determined that the maintenance of dispersal habitat associated with these projects may affect, but is not likely to adversely affect (NLAA), northern spotted owls because:

- Canopy cover in treated stands will be maintained at 40 percent.
- The proposed treatments will be dispersed throughout the watersheds to minimize the potential for adversely affecting spotted owl dispersal.
- Maintenance activities within dispersal would not remove the components important to the dispersal of owls, and would make the residual habitat healthier and more ecologically sustainable over time.

4.2 Effects to CHU

No timber harvest is proposed in 2008 CHU. Because no action will occur within lands currently designated as CHU, the proposed action will have "*No Effect*" on 2008 CHU.

4.3 Effects to Spotted Owls

4.3.1 Effects to NRF in Nest Patch, Core Area, and Home Range

There are a total of 52 documented spotted owl sites, and 11 generated owl sites, whose home ranges overlap the proposed project units (combined total of 63).

Owl sites were analyzed at the nest patch, core area, and provincial home range scales as described in the Definition Section (1.3.2). We evaluated pre-project and post-project NRF habitat percentages at these scales for the four owl sites (both documented and generated) in the Action Area with changes to Federal NRF habitat as a result of the proposed action (Table 9).

"Treat and maintain" treatment in NRF habitat would occur within the home ranges of 26 out of the 63 owl sites. Approximately 435 acres of NRF habitat would be treated and maintained within these 26 home ranges.

"Treat and maintain" treatment in NRF would occur within the 0.5 mile Core Area for seven sites (out of the 26). Approximately 120 acres (out of the 435 acres) of NRF habitat would be treated and maintained within 0.5 miles of these seven owl sites. Light- to- moderate thinning

types of actions that maintain the extent and function of NRF habitat within a core area are generally not likely to have adverse effects to spotted owls (USDI and USDA 2008).

Table 9. Effects to Spotted Owl Sites at the Nest Patch, Core Area, and Home Range

	Nest Patch (300m)		Core Area (0.5 miles)		Home Range (1.3/1.2 miles)		Sales Affecting Sites
	Current NRF acres (% NP)	Post NRF acres (% NP)	Current NRF acres (% Core)	Post NRF acres (% Core)	Current NRF acres (% HR)	Post NRF acres (% HR)	(Province)
Site # 11G (BLM)							
All NRF	43 (61)	43 (61)	186 (37)	182 (36)	1,293 (38)	1,277 (38)	Skeleton Mountain (Klamath)
Federal NRF Only	43 (61)	43 (61)	164 (33)	160 (32)	775 (23)	759 (22)	
Site # 25G (BLM)							
All NRF	9 (12)	9 (12)	211 (42)	211 (42)	1,360 (40)	1,357 (40)	Musty Evans (Klamath)
Federal NRF Only	8 (11)	8 (11)	144 (29)	144 (29)	692 (20)	689 (20)	
Site # 27G (BLM)							
All NRF	37 (52)	37 (52)	137 (27)	137 (27)	1,004 (29)	1,001 (29)	Musty Evans (Klamath)
Federal NRF Only	35 (50)	35 (50)	101 (20)	101 (20)	350 (10)	347 (10)	
Site # 4032O (BLM)							
All NRF	65 (93)	65 (93)	425 (85)	425 (85)	2,018 (59)	2,002 (59)	Skeleton Mountain (Klamath)
Federal NRF Only	65 (93)	65 (93)	336 (67)	336 (67)	1,542 (45)	1,526 (45)	

4.3.2 Site Descriptions for Effects to Individual Owl Sites and NRF Habitat

The following is a detailed analysis of each home range that would be affected by NRF habitat downgrade and the treatments and processes that will be incorporated by the BLM if completed surveys determine spotted owl occupancy within the home ranges of the following sites.

Site # 11G (Musty Evans)

This site was generated through the OEM process in unsurveyed suitable habitat where no known owls occur. The home range overlaps with that of site #4032O, but they do not share the same acreage of NRF downgrading. Pre-treatment NRF acres on Federal lands in this home range and core area are below the OEM thresholds identified in the Owl Estimation

Methodology considered necessary to maintain spotted owl life history functions (Appendix C). Sixteen acres of NRF downgrading would occur in the home range of site #11G, four of which would occur within the half-mile core area. As stated in the Owl Estimation Methodology, "generated points are based on a computer simulation that may not reflect actual spotted owl locations on the landscape." Therefore, protocol surveys to determine occupancy will be completed before a final decision is made as to how the NRF habitat is treated within this home range. Surveys will use the "*2011 Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls*" (2011 NSO Survey Protocol) to cover all suitable nesting habitat within the home range (1.3 miles) of this 16-acre unit. One season of survey was already completed in 2010 with no owl detections here. If spotted owls are found within the provincial radius of this unit during the second year of surveys in 2011 (anticipated to be completed before a final decision is signed by the Project Manager), the BLM will modify the project to avoid an adverse impact. Units within any new nest patch will be dropped from the sale or modified in accordance to the OEM guidelines.

Site # 25G (Skeleton Mountain)

This site was generated through the OEM process in unsurveyed suitable habitat where no known owls occur. Pre-treatment NRF acres on Federal lands in this home range are below the OEM thresholds considered necessary to maintain spotted owl life history functions. Three acres of NRF downgrading would occur in the home range of site #25G. As stated in the Owl Estimation Methodology, "generated points are based on a computer simulation that may not reflect actual spotted owl locations on the landscape." Therefore, protocol surveys to determine occupancy will be completed before a final decision is made as to how the NRF habitat is treated within this home range. The BLM will survey using the 2011 NSO Survey Protocol to cover all NRF habitat within the home range of this three-acre unit. One year of surveys were completed in 2010 with a one-time response of a male owl approximately one mile northwest of site center. As stated in the 2011 NSO Survey Protocol:

> *"RESIDENT SINGLE STATUS* is established by any one of the following criteria:
> 1. The presence or response of a single owl within the same general area on 3 or more occasions within the breeding season, with no response by an owl of the opposite sex after a complete survey; or
> 2. Multiple responses over several years (e.g., 2 responses in year 1 and 1 response in year 2) from the same general area."

If spotted owl occupancy is determined within the provincial radius of this unit during the second year of surveys in 2011 (anticipated to be completed before a final decision is signed by the Project Manager), the BLM will modify the project to avoid an adverse impact.

Site # 27G (Musty Evans)

This site was generated through the OEM process in unsurveyed suitable habitat where no known owls occur. Pre-treatment NRF acres on Federal lands in this home range are below the OEM thresholds considered necessary to maintain spotted owl life history functions. The site overlaps with site #25G and the same three acres of NRF downgrading would occur within the home range of site #27G. As stated in the Owl Estimation Methodology, "generated points are based on a computer simulation that may not reflect actual spotted owl locations on the

landscape." Therefore, protocol surveys to determine occupancy will be completed before a final decision is made as to how the NRF habitat is treated within this home range. The BLM will survey using the 2011 NSO Survey Protocol to cover all NRF habitat within the home range of this three-acre unit. One season of survey was already completed in 2010 with no owl detections here. If spotted owl occupancy is determined within the provincial radius of this unit during the second year of surveys in 2011 (anticipated to be completed before a final decision is signed by the Project Manager), the BLM will modify the project to avoid an adverse impact.

Site # 4032O (Skeleton Mountain)

Sixteen acres of NRF downgrade would occur within the home range of this documented site and post-treatment NRF will remain above OEM home range and core thresholds. The proposed treatments are located at the outer border of the home range. This site has been monitored every year by BLM since 1993. The site had an active pair that remained in or near the 100-acre KSOAC from 1993 through 2004. The last year the site had an active nesting pair was 2002. In 2003 and 2004, the pair did not successfully nest. In 2005, the resident, banded, male was located near the site center without a mate during seven survey visits (4 daytime and 3 nighttime). Non-nesting status was confirmed at this site. No spotted owl responses were heard during surveys in 2006-2009 when the surveys of the historic site and surrounding suitable habitat were completed. A barred owl was detected in 2007 and again in 2010. The area was surveyed six times in 2006 (3 daytime and 3 nighttime), three times in 2007 (2 daytime and 1 nighttime), five times in 2008 (3 daytime and 2 nighttime), and four times in 2009 (4 nighttime).

In 2010, the NRF project acres within this historic home range were surveyed, including suitable habitat within a 1.3-mile radius of the NRF project acres, following the "*Draft 2010 Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls."* All Federal land within the home range of site 4032O was surveyed six times, with one spotted owl detection approximately 0.8 miles northeast of site center and 0.5 miles from the nearest NRF downgrade project unit. If owls are detected during the second year of surveys (anticipated to be completed before a final decision is signed by the Project Manager), occupancy status will be determined following the 2011 NSO Survey Protocol. Surveys will continue within the home range over the next one to five years, depending on the harvest schedule, and units within any new nest patches will be dropped or modified from the sale plan following E4 stipulations in the sale contract. Actions proposed within this historic home range are not likely to adversely affect owls because pre-treatment acres of NRF are above OEM thresholds and will continue to be, post-treatment.

4.3.3 Effects to Dispersal in the Nest Patch, Core Area, and Home Range

Owl sites were analyzed at the nest patch scale as described in the Definition Section (1.3.2). We evaluated pre-project and post-project dispersal habitat as a result of the proposed action planned in the nest patch of the three generated owl sites in the Action Area (Table 10). One unoccupied, historic site was included in the analysis, even though only capable habitat will be treated.

"Treat and maintain" treatment would occur within dispersal habitat within the home ranges of 56 (out of the 63 total) owl sites. Approximately 1,820 acres of dispersal habitat would be treated and maintained within these 56 home ranges.

"Treat and maintain" treatment would occur within dispersal habitat of three nest patches. Light-to- moderate thinning types of actions that maintain the extent and function of dispersal are proposed within these unoccupied owl sites.

Three sites are discussed in more detail because additional site-specific data analysis demonstrates the proposed treatments are not expected to result in an adverse effect to owls.

Table 10. Effects to Spotted Owl Sites at the Nest Patch Level

Nest Patch All Ownerships Current % NRF	Nest Patch BLM Only Current % Dispersal	Nest Patch BLM Only Dispersal Treatment Acres	Sales Affecting Sites Klamath Province
Site # 11G			
61	39	2	Skeleton Mountain
Site # 25G			
12	45	19	Musty Evans
Site # 30G			
26	66	18	Musty Evans
Site # 4030O			
2	17	0	Evans Stewardship

4.3.4 Site Descriptions for Effects to Individual Owl Sites and Dispersal Habitat

The following is a detailed analysis of each nest patch that would be affected by dispersal habitat treatments and processes that will be incorporated by the BLM to avoid adversely affecting spotted owls. These sites are not included in Table 9 because only dispersal maintenance treatments would occur and would not result in changes to the baseline.

Site # 11G

Treatments would occur within the nest patch of site 11G, an area where the OEM process suggests could adversely affect owls. Even with the proposed treatments in the nest patch, the treatments would maintain and not remove dispersal habitat. A modified Dry Forest Restoration treatment is proposed in two acres of the nest patch that would maintain at least 40 percent canopy closure. Within the nest patch, the 43 acres of existing NRF habitat would not be treated and no nest trees would be removed. The proposed action would retain suitable amounts of thermal and hiding cover for dispersal, and retain potential nest and roost trees.

One of the OEM guidelines to make a LAA determination is whether or not the treatment covers a large portion of the area (pg. 14). Only three percent of the nest patch would be impacted from dispersal maintenance treatments, which is not considered to be a large portion of the nest patch area.

The BLM will conduct protocol surveys here for the next one to five years, depending on the harvest schedule. One season of survey was already completed in 2010 with no owl detections here. If spotted owls are found within the provincial radius of this unit, the BLM will modify the project, following E4 stipulations in the sale contract. Units within any occupied nest patch will be dropped from the sale or modified in accordance to the OEM guidelines.

The proposed action within this nest patch would not adversely affect owls because treatments would be dropped or altered if owls are found occupying the site.

Site # 25G

Approximately 20 acres of Dry Forest Restoration prescriptions would occur in dispersal within the nest patch of this generated owl site, but will not change the dispersal quantity. At least 40 percent canopy cover would be maintained in these 20 acres. Currently, only 13 percent of the nest patch is NRF habitat. Approximately 41 percent of the nest patch for 25G is habitat capable of becoming suitable habitat.

Protocol surveys to determine occupancy will be completed before a final decision is made as to how the nest patch is treated within this home range. One season of survey was already completed in 2010 with no owl detections here. If spotted owls are found within the provincial radius of this unit, the BLM will modify the project to avoid an adverse effect. Units within any occupied nest patch will be dropped from the sale or modified in accordance to the OEM guidelines.

The proposed action within this nest patch would not adversely affect owls because treatments would be dropped or altered if owls are found occupying the site.

Site # 30G

Treatments would occur within the nest patch of site 30G. The treatments would maintain and not remove dispersal habitat. A modified Dry Forest Restoration treatment is proposed in 18 acres of the nest patch that would maintain at least 40 percent canopy closure. Within the nest patch, the 18 acres of existing NRF habitat would not be treated and no nest trees would be removed. The proposed action would minimize impacts to prey species, retain suitable amounts of thermal and hiding cover, and retain potential nest and roost trees.

The BLM will conduct protocol surveys in NRF habitat here for the next two to five years, depending on the harvest schedule. If spotted owls are found within the provincial radius of this unit, the BLM will modify the project to avoid an adverse effect on owls. Units within any occupied nest patch will be dropped from the sale or modified in accordance to the OEM guidelines.

The proposed action within this nest patch would not adversely affect owls because treatments would be dropped or altered if owls are found occupying the site.

Site # 4030O

Treatments would occur within the nest patch of site 4030O. Presently, only two percent of the nest patch contains NRF habitat, which is located on private industrial timberland. The total percent NRF in the entire home range is also below OEM thresholds. Small diameter thinning, or stewardship, treatments are proposed in 10 acres of capable habitat within the nest patch. Recent survey history demonstrates that site 4030O has been unoccupied for several years.

Nesting, roosting, and foraging habitat, along with the historic activity center, are being surveyed within the home range of the site on BLM-managed land. Spotted owls have never been found nesting at this site. Six survey visits were made in 2010, with one detection of a single male. In 2009, six night surveys were conducted with no responses. Four night survey visits were made in 2008, with no owl detections. In 2007, two night visits were made with no detections. One day and five night visits were conducted in 2006; six night visits in 2005; six night visits in 2004; and six night visits in 2003; all with no owl detections.

First located in 1993, site 4030O has only had detections from single spotted owls on an intermittent basis. Pair status was never confirmed at the site and review of aerial photos and the habitat layer in GIS demonstrate that there may not be enough NRF habitat available within this home range to make it a viable site.

The historic activity center and surrounding NRF habitat will be surveyed in the next one to five nesting seasons, depending on the harvest schedule, and treatments of the nest patch will be dropped from consideration if the site becomes reoccupied.

4.3.4 Effects to RA 32 Habitat

Timber sale and small diameter thinning units were evaluated for the presence of structurally complex, RA 32 habitat. No timber harvest or small diameter thinning is proposed in RA 32 stands.

Approximately 0.2 miles of road renovation is proposed across an RA 32 stand. The stand is comprised of approximately 20 acres and has an existing road, in poor condition, crossing through the middle of it. It would be used to access adjacent timber harvest units. In its current condition, the road could not be used by large trucks because it has deep ruts and eroded sections. There are no trees growing in the road and there is no course woody material on the road. The road would be graded and smoothed out to allow for machinery to pass through the stand.

Road renovation in this RA 32 stand is not anticipated to adversely affect spotted owls because it is currently functioning as a road and no trees or course woody material would be removed from the stand. One season of protocol surveys were completed around this stand with no responses from owls. Surveys will continue during the next one to five years, depending on harvest schedule, and if owl occupancy if determined, the appropriate seasonal restriction will be implemented for specified activities.

4.4 Effects to Spotted Owl Prey

The northern flying squirrel, red tree vole, dusky-footed woodrat, and bushy-tailed woodrat, are important prey of the northern spotted owl in Southwest Oregon (Forsman *et al.* 2004). Timber harvest and fuels reduction projects may impact foraging by changing habitat conditions for prey. Sakai and Noon (1993) stated that dusky-footed woodrats, the primary prey of owls in our area, might benefit from some thinning or harvest that would increase shrub and pole stands. Bushy-tailed woodrat presence is more dependent on cover and food availability than on seral stage. They often use areas previously disturbed by fire (Carey 1991). Bushy-tailed woodrats are most abundant along streams, and riparian areas may serve as the principal avenue for woodrat recolonization (Carey et al 1992).

Lemkuhl *et al.* (2006) found that fuels projects in eastern Washington could have impacts on bushy-tailed woodrats, but confirmed the importance of maintaining snags, down wood, and mistletoe. These components will be retained as part of our proposed action. Some information suggests that there may be negative impacts of thinning on flying squirrels in young stands. Recent research appears to be indicating negative, persistent (decades-long) flying squirrel response to contemporary thinning prescriptions in second-growth conifer plantations (Wilson 2010). There is also some counter information as to these effects, however (e.g., Gomez *et al.* 2005, Waters and Zabel 1995). Gomez *et al.* (2005) noted that commercial thinning in young stands of Coastal Oregon Douglas-fir (35 to 45 years old) did not have a measurable short-term effect on density, survival, or body mass of northern flying squirrels. Similarly, Waters and Zabel (1995) compared squirrel densities and body mass in shelterwoods and in old and young stands in the northern Sierras (old = 3.29/Ha, shelterwood = 0.31/ha, young = 2.28/Ha) and found no difference in body mass or recapture rates between young and old stands. They concluded that heavy logging and site preparation (burning) in the shelterwoods negatively affected flying squirrels, however. While flying squirrels may inhabit some of the young stands in the Action Area, it is not likely that they will be significantly affected by the proposed actions and spotted owls will continue to have access to this prey species post-treatment.

A dispersal stand that resulted from the downgrade of NRF habitat would begin to develop the pretreatment habitat within 25 to 40 years, depending on treatment type, plant association, and location. Residual trees, snags, and down wood that are retained in the thinned stands will provide some cover for prey species over time, and will help minimize harvest impacts to some prey species. Lemkuhl *et al.* (2006) found that fuels projects in eastern Washington could have impacts on bushy-tailed woodrats, but confirmed the importance of maintaining snags, down wood, and mistletoe.

Residual trees, snags, and down wood that are retained in the thinned stands will provide some cover for prey species over time, and will help minimize harvest impacts to some prey species. The retained trees may respond favorably to more light and resources and gain height and canopy over time. Prey animals may be more exposed in the disturbed area or may move away from the disturbed area for the short-term. Some minor changes in prey availability may occur as cover is disturbed and animals move around in the understory. They may become more vulnerable and exposed. The disturbance might attract other predators such as hawks, other

owls, and mammalian predators. This may increase competition for owls in the treatment area, but the exposure of prey may also improve prey availability for northern spotted owls.

Some disturbance of habitat may improve forage conditions, provided that understory structure and cover are retained. Removal of some tree canopy, provided it is not too extreme, will bring more light and resources into the stand, stimulating forbs, shrubs and other prey food. Once the initial impact of disturbance recovers (6 months to 2 years), the understory habitat conditions for prey food would increase over the next few years, until shrubs and residual trees respond and once again close in the stand.

Edges created from harvest can be areas of good prey availability and potentially increased vulnerability (i.e., better hunting for owls) (Zabel 1995). Prey animals may be more exposed in the disturbed area or may move away from the disturbed area for the short-term. Some minor changes in prey availability may occur as cover is disturbed and animals move around in the understory. They may become more vulnerable and exposed. The disturbance might attract other predators such as hawks, other owls, and mammalian predators. This may increase competition for owls in the treatment area, but the exposure of prey may also improve prey availability for northern spotted owls.

Bingham and Noon (1997) reported that a spotted owl core area is the area that provides the important habitat elements of nest sites, roost sites, and access to prey, benefiting spotted owl survival and reproduction. Rosenberg and McKelvey (1999) reported that spotted owls are "central place" animals with the core area (the area closest to the nest) being the focal area. Several studies (Wagner and Anthony 1998, Dugger *et al.* 2005, Zabel *et al.* 2003, Bingham and Noon 1997) indicate the core area size for the Klamath and Western Cascades provinces is 0.5 miles (or 500 acres) of the nest site. Therefore, effects to prey species are most critical at the nest patch and core areas. Effects to spotted owl sites at the nest patch and core areas are analyzed in Section 4.3 above and the indirect effects to prey species can be derived from this data. For all projects, treatment implementation would be spread out temporally and spatially within the Action Area, which would provide areas for spotted owl foraging during project implementation and reduce the impact of these short-term effects at the project level. Conservation measures were implemented, such as ten-acre buffers for active red tree vole nests, across the Action Area (Section 2.5).

Opening a stand through tree harvest can also provide more light to the ground and increase understory trees and shrubs. The results of this treatment on owl habitat depends on the current stand condition (and how close it approximates old-growth characteristics considered important to owls), how many trees are removed, the residual overstory, the aerial extent of the treatment, the time of year the treatment occurs, and the type of tree removal. PDC and normal operating procedures applied by the Medford BLM reduce the impacts to the extent possible, while still facilitating tree harvest and other projects. Treatment areas are small enough and dispersed enough that many resident prey species could move to adjacent patches until the stand recovers.

4.5 Effects of Disturbance to Northern Spotted Owls

Mandatory PDC will be incorporated into all proposed action activities (Appendix A). Applying the Mandatory PDC should avoid an adverse effect to nesting owls and their young that might occur from noise or activity, but may not reduce the adverse effects of habitat removal. Nesting owls are confined to an area close to the nest, but once the young fledge, they can move away from noise and activities that might cause them harm. Since all projects will follow mandatory PDCs that restrict activities to outside of the breeding season and beyond recommended disturbance distance thresholds (Appendix A), no adverse effect to nesting owls, or their young, is expected from project related noise or activities.

4.6 Interrelated and Interdependent Effects

Interrelated actions are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that might occur independently of the larger action, but have no independent utility apart from the action under consideration. Interdependent actions depend on the Federal action and would make no sense without it.

All proposed timber harvest projects in this BA will have interrelated and interdependent effects. Timber harvest projects often have activities directly or indirectly associated with their completion, such as road construction or timber hauling on existing system roads. Acres logged as part of road building are included in the totals for the timber harvest. Post-harvest brush disposal is another interrelated and interdependent action to timber harvest. Brush disposal activities vary by timber sale due to fuels management objectives, requirements for retention of down woody material, and other resource management goals. Typical activities associated with this program include biomass removal, pile burning; underburning; and rearranging fuels by crushing, mulching, and lopping and scattering. Another interrelated and interdependent effect from timber harvest is the possible reduction in the size and continuity of existing late-successional stands, and interior forest habitat.

Noise and activity can also be an interrelated interdependent effect that would not occur “but for” the harvest activity. All noise and activity impacts are analyzed as part of the harvest treatment activities when in the occupied habitat, as defined by the OEM.

4.7 Cumulative Effects

Cumulative effects under ESA are “those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the Action Area of the Federal action subject to consultation” (50 CFR 402.02). The effects of future Federal actions will be evaluated during future section 7 consultations and are not included in cumulative effects under ESA. Cumulative effects analysis of foreseeable state and private actions provide the Service and the Medford BLM an accurate environmental baseline to assess impacts of Federal actions.

The land base in the Action Area has a checkerboard pattern of ownership of private land interspersed with BLM lands. A range of management practices occur on private lands from residential home site development to intensive industrial timber management.

In the Biological Opinion for the NWFP (USDA and USDI 1994b, Appendix G, 44-45), the Service concluded,

> "Non-Federal landowner compliance with the take prohibition of the [Endangered Species] Act does not assure the maintenance of spotted owl dispersal habitat within Areas of Concern and checkerboard ownership nor provide for improvement of existing populations. Consequently, it is likely that a reduction in dispersal habitat would occur on non-Federal lands in certain areas."

The majority of state and private forests in Washington, Oregon, and Northern California are managed for timber production. Non-Federal lands are not expected to provide demographic support for spotted owls across and between physiographic provinces (Thomas *et al.* 1990; USDA and USDI 1994a). Historically, non-Federal landowners practiced even-aged management (clear-cutting) of timber over extensive acreages. Private industrial forestlands are managed for timber production and will typically be harvested between 40 and 60 years of age, in accordance with State Forest Practices Act standards. In 2008, during the development of the DA BA FH (USDI 2008), data was requested from Oregon Department of Forestry and the Pacific Northwest Inventory and Analysis team to help determine harvest rates in the past decade on private lands within the Medford district. These records indicated private harvest rates in Jackson and Josephine Counties have never exceeded 1.08 percent of the total private lands per year since 1998. These records did not provide information of pre-treatment habitat conditions. We anticipate some loss of owl habitat on private lands, but cannot predict the rate of loss, or the specific location of harvest.

The Medford BLM assumes these past management practices will continue and reduce the amount of NRF habitat for spotted owl on non-Federal lands over time. Harvest activities on state and private lands can be expected to impact spotted owls located within adjacent Federal lands by removing and fragmenting habitat and through disturbance activities adjacent to occupied sites during sensitive periods. Under Oregon Forest Practice Rules (629-665-0210), owl nest sites (70-acre core areas) are protected for at least three years following the last year of occupation.

5. Biological Assessment Conclusions

It is the conclusion of this biological assessment that proposed actions may affect the spotted owl species as documented above. Formal consultation is requested for projects listed in Table 11 because they are "may affect, likely to adversely affect" actions for spotted owls. All activities are in compliance with the NWFP, Medford RMP, and current spotted owl consultation parameters.

Medford BLM seeks formal consultation on three projects for spotted owls that may affect and are likely to adversely affect northern spotted owls due to 55 acres of NRF downgrade. Medford seeks concurrence for the three projects that may affect, but is not likely to adversely affect spotted owls. Medford BLM has planned these projects to avoid adversely affecting individual, active owl sites resulting from treatments at the nest, core, or home range level.

The proposed action would also result in an increase of dispersal-only habitat within the watersheds in the Action Area.

Table 11. Effects Determination by Project		
Project	**Project plan design to reduce impacts to spotted owls**	**Effects to Spotted Owls**
Evans Sardine	All actions occur outside the nest patch. Approximately 11 acres of NRF downgrade proposed. One acre of NRF downgrade would occur at the outer edge of an active home range. Seasonal restriction of 0.25 miles of nesting owls.	LAA
Evans Stew	Approximately 625 acres of small diameter thinning in dispersal habitat proposed. The remainder of the project would occur in capable habitat. Ten acres of capable habitat would be thinned in an unoccupied nest patch, increasing growth of overstory trees and reducing fire danger. Treatment would be dropped if the site is found to be occupied following protocol surveys. Seasonal restriction of 0.25 miles of nesting owls. Seasonal restriction of 0.25 miles of nesting owls.	NLAA
Musty Evans	Approximately three acres of NRF downgrade proposed. Surveys will be done in two spotted owl generated sites to reaffirm no occupancy where habitat removal is proposed. If owls are found, harvest units within the provincial radius would be dropped or changed to a "treat and maintain." Seasonal restriction of 0.25 miles of nesting owls.	LAA
Pleasant Fielder	All actions occur outside the nest patch. No NRF would be downgraded or removed and no dispersal habitat would be removed. Harvest within 258 acres of dispersal and nine acres of NRF would be "treat and maintain." Seasonal restriction of 0.25 miles of nesting owls. Seasonal restriction of 0.25 miles of nesting owls.	NLAA
Skeleton Mountain	Approximately 40 acres of NRF downgrade proposed. Surveys will be done in one generated site and one known spotted owl site to reaffirm no occupancy where habit downgrade is proposed. If owls are found, harvest units within the provincial radius would be dropped or changed to a "treat and maintain." NRF downgrade would occur in lower suitability habitat as portrayed by the MaxEnt model. Seasonal restriction of 0.25 miles of nesting owls.	LAA
Slick Battle	All actions occur outside the nest patch. No NRF would be downgraded or removed and no dispersal habitat would be removed. Harvest within 82 acres of dispersal and 128 acres of NRF would be "treat and maintain". Seasonal restriction of 0.25 miles of nesting owls.	NLAA

Literature Cited

Agee, J.K. 1993. Fire Ecology of Pacific Northwest Forests. Island Press, Washington, DC.

Agee, J.K. 2003. Historical range of variability in eastern Cascades forests, Washington, USA. Landscape Ecol 18:725–740.

Agee, James K. and Carl N. Skinner. 2005. "Basic principles of forest fuel reduction treatments". Forest Ecology and Management. 211 (2005) 83-96.

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R.J. Gutiérrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern. 2006. Status and trends in demography of northern spotted owls, 1985–2003. Wildlife Monograph No. 163.

Atzet, T. and D. Wheeler. 1982. Historical and Ecological Perspectives on fire activity in the Klamath Geological Province of the Rogue River and Siskiyou National Forests. R6 Range-102-1982. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Region. 16 p.

Bart, J. and E.D. Forsman. 1992. Dependence of Northern Spotted Owls, *Strix occidentalis caurina*, on Old-Growth Forests in the Western United States. Biological Conservation 62(2):95-100.

Bingham, B. and B.R. Noon. 1997. Mitigation of Habitat Take: Application to Habitat Conservation Planning. Conservation Biology 11(1):127-139.

Carey, A.B. 1991. "The biology of arboreal rodents in Douglas-fir forests." General Technical Report PNW-276, USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutiérrez, J.M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the northern spotted owl. Sustainable Ecosystems Institute. Portland, Oregon. September 2004.

Davis, Liane R., Klaus J. Puettmann, and Gabriel F. Tucker. 2007. Overstory response to alternative thinning treatments in young Douglas-fir forests of Western Oregon. Northwest Science. 81(1): 1-14.

Dugger, K.M., F. Wagner, R.G. Anthony, and G.S. Olson. 2005. "The relationship between habitat characteristics and demographic performance of northern spotted owls in southern Oregon." *Condor* 107:863-878.

Forsman, E.D., R.G. Anthony. 2011. Population Demography of Northern Spotted Owls, 1985-2008. *In Press. Avian Biology* 40, July, 2011.

Forsman, E.D., E.C. Meslow, and H.M. Wight. 1984. "Distribution and biology of the spotted owl in Oregon." *Wildlife Monographs* 87:0084-0173.

Forsman, E.D., R.G. Anthony, E.C. Meslow, and C.J. Zabel. 2004. "Diets and Foraging Behavior of Northern Spotted Owls in Oregon." *J. of Raptor Res.* 38(3):214-230.

Johnson, K.N., and Franklin, J.F. 2009. "Restoration of Federal Forests in the Pacific Northwest: Strategies and Management Implications."

Lemkuhl, J , K.D. Kistler and J.S. Begley. 2006. "Bushy-tailed woodrat abundance in dry forests of eastern Washington." *Journal of Mammalogy* 87(2):371-379.

Hann, D.W., 2003. Organon User Manual Edition 7.0. Department of Forest Resources, Oregon State University, Corvallis, OR. 129 p.

Hessburg, P.F., and J.K. Agee. 2003. "An environmental narrative of Inland Northwest United States forests, 1800–2000." *Forest Ecology and Management* 178:23–59.

Latham, P., and J. Tappeiner. 2002. "Response of old-growth conifers to reduction in stand density in western Oregon forests." *Tree Physiology* 22:137-146.

Main, M. L., and M.P. Amaranthus. "Reducing Stand Densities in Immature and Mature Stands, Applegate Watershed, Southwest Oregon." USDA US Forest Service PNW. General Technical Report PNW-RN-518.

Moeur, Melinda, Thomas A. Spies, Miles Hemstrom, Jon R. Martin, James Alegria, Julie Browning, John Cissel, Warren B. Cohen, Thomas E. Demeo, Sean Healey, Ralph Warbington. 2005. "Status and Trend of Late-Successional and Old-Growth forest." USDA US Forest Service PNW. General Technical Report PNW-GTR-646.

Newton, M., M.L. McCormack Jr., R.L Sajdak, and J.D. Walstad. 1987. Forest vegetation problems in the Northeast and Lake States/Provinces. In Forest Vegetation Management for Conifer Production, ed. J.D. Walstad and P.J. Kuch. Wiley, New York. Pp 77–104.

Rosenberg, D.K. and K.S. McKelvey. 1999. "Estimation of habitat selection for central-place foraging animals." *Journal of Wildlife Management* 63(3):1028-1038.

Sakai, H.F. and B.R. Noon. 1993. "Dusky-footed woodrat abundance in different-aged forests in northwestern California." *Journal of Wildlife Management* 57:373-382.

Thomas, J.W., E.D., Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. "A conservation strategy for the northern spotted owl: report of the Interagency Scientific Committee to address the conservation of the northern spotted owl." USDA Forest Service,

USDI Bureau of Land Management, USDI Fish and Wildlife Service, and USDI National Park Service. Portland, OR. 427 pp.

USDA Forest Service, USDC National Marine Fisheries Services, USDI Bureau of Land Management, USDI Fish and Wildlife Service, and US Environmental Protection Agency. 1993. "Forest ecosystem management: an ecological, economic, and social assessment." Report of the Forest Ecosystem Management Assessment Team. US Forest Service, US Fish and Wildlife Service, National Marine Fisheries Service, National Park Service, Bureau of Land Management, and Environmental Protection Agency, Portland, OR.

USDA Forest Service, USDC National Marine Fisheries Services, USDI Bureau of Land Management, and USDI Fish and Wildlife Service.1999. "Streamlined Consultation Procedures for Section 7 of the Endangered Species Act (ESA) July 1999." BLM Information Bulletin Number OR-99-276.

USDA Forest Service, USDC National Marine Fisheries Services, USDI Bureau of Land Management, and USDI Fish and Wildlife Service. 2002. *Endangered Species Act Consultation Handbook* (abridged). July 2002.

USDA Forest Service and USDI Bureau of Land Management. 1994a. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl US Government Printing Office, Portland, OR.

USDA Forest Service and USDI Bureau of Land Management, 1994b. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. Includes Standards and Guidelines for Management of Late-Successional and Old-Growth Dependent Species Within the Range of the Northern Spotted Owl. US Government Printing Office, Portland, OR.

USDA Forest Service and USDI Bureau of Land Management. 2003. Rogue River/South Coast Biological Assessment FY 04-08 for Activities that May Affect Listed Species in the Rogue River/South Coast Province for Medford District Bureau of Land Management, Rogue River and Siskiyou National Forests, 11 July 2003

USDI Bureau of Land Management, Medford District. 1995. *Medford District Record of Decision and Resource Management Plan,* Medford, OR.

USDI Bureau of Land Management. 2006. Formal consultation on activities that may affect listed species on public lands administered by the Medford District BLM (District) during fiscal years 2006 through 2008 (FY 06-08) (FWS Log #: 1-15-06-F-0162).

USDI Bureau of Land Management. 2008a. FY 2009-2013 Programmatic Assessment For Activities that May Affect the listed endangered plant species Gentner's Fritillary, Cook's Lomatium, McDonald's rockcress, and large-flowered wooly meadowfoam. Medford BLM.

USDI Bureau of Land Management. 2008b. Medford BLM District Analysis and Biological Assessment of Forest Habitat (DA BA FH). October 2008. Medford District Bureau of Land Management, Medford, OR.

USDI Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants; determination of threatened status for the northern spotted owl; final rule. 55 Federal Register 123:26114-26194.

USDI Fish and Wildlife Service. 2010. "2010 Draft Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*)." US Fish and Wildlife Service, Portland, Oregon xii + 178 pp.

USDI Fish and Wildlife Service, USDI Bureau of Land Management and USDA Forest Service. 2008. Metholodology for estimating the number of northern spotted owls affected by proposed Federal actions. Version 2.0. Oregon Fish and Wildlife Office, Fish and Wildlife Service, Portland, OR.

Wagner, F.F. and R.G. Anthony. 1998. "Reanalysis of northern spotted owl habitat use on the Miller Mountain study area. A report for the Research Project: Identification and evaluation of northern spotted owl habitat in managed forests of southwest Oregon and the development of silvicultural systems for managing such habitat." Oregon Cooperative Wildlife Research Unit, Depar.Fisheries and Wildlife, Oregon State Univ. Corvallis, OR.

Wilson, T.M. 2010. "Limiting factors for northern flying squirrels (Glaucomys sabrinus) in the Pacific Northwest: A spatio-temporal analysis." Union Institute and University, Cincinnati, Ohio.

Zabel, C.J., K. McKelvey, and J.D. Johnston. 1992. "Patterns of habitat use by California Spotted Owls in logged forests of the northern Sierra Nevada." USDA Forest Service General Technical Report PSW-GTR-133.

Zabel, C.J., K. McKelvey, and J.P. Ward. 1995. "Influence of primary prey on home range size and habitat use patterns of northern spotted owls (*Strix occidentalis caurina*)." *Canadian Journal of Zoology* 73:433-439.

Zabel, C.J., J.R. Dunk, H.B. Stauffer, L.M. Roberts, B.S. Mulder, and A. Wright. 2003. "Northern spotted owl habitat models for research and management application in California (USA)." *Ecological Applications* 13(4):1027-1040.

Appendix A: Project Design Criteria (PDC)

Project design criteria (PDC) are measures applied to project activities designed to minimize potential detrimental effects to proposed or listed species. PDC usually include seasonal restrictions and may also include clumping of retention trees around nest trees, establishment of buffers, dropping the unit(s)/portions, or dropping the entire project. Use of project design criteria may result in a determination of no effect for a project that would have otherwise been not likely to adversely affect. In other cases, project design criteria have resulted in a determination of not likely to adversely affect for a project that might have otherwise been determined to be likely to adversely affect. The goal of project design criteria is to reduce adverse effects to listed or proposed threatened or endangered species.

Physical impacts to habitat and disturbances to spotted owls will be reduced or avoided with PDC. Listed are project design criteria designed for the programmatic impacts discussed in the *Effects of the Action* section.

Medford BLM retains discretion to halt and modify all projects, anywhere in the process, should new information regarding proposed and listed threatened or endangered species arise. Minimization of impacts will then, at the least, include an appropriate seasonal restriction; and could include clumping of retention trees around the nest trees, establishment of buffers, dropping the unit(s)/portions, or dropping the entire project.

The seasonal or daily restrictions listed below may be waived at the discretion of the decision maker if necessary to protect public safety (as in the case of emergency road repairs or hazard tree removal). Emergency consultation with the Service will then be initiated in such cases, where appropriate.

PDC for disturbance are intended to reduce disturbance to nesting spotted owls. For this consultation, potential disturbance could occur near either documented owl sites or projected owl sites. To estimate likely occupied habitat outside of known home ranges, nearest-neighbor distances and known spotted owl density estimates were utilized to "place" potential spotted owl occupied sites in suitable habitat

Any of the following Mandatory PDC may be waived in a particular year if nesting or reproductive success surveys conducted according to the USFWS endorsed survey guidelines reveal that spotted owls are non-nesting or that no young are present that year. Waivers are only valid until March 1 of the following year. Previously known sites/ activity centers are assumed occupied until protocol surveys indicate otherwise.

Mandatory Project Design Criteria

A. Activities (such as tree felling, yarding, road construction, hauling on roads not generally used by the public, prescribed fire, muffled blasting) that produce loud noises above ambient levels will not occur within specified distances (Appendix A-1) of any documented or projected owl site between March 1 and June 30 (or until two weeks after the fledging period) – unless protocol

surveys have determined the activity center is non-nesting or failed in their nesting attempt. The distances may be shortened if significant topographical breaks or blast blankets (or other devices) muffle sound traveling between the work location and nest sites.

B. The action agency has the option to extend the restricted season until September 30 during the year of harvest, based on site-specific knowledge (such as a late or recycle nesting attempt) if project would cause a nesting spotted owl to flush. (See disturbance distance).

C. Burning will not take place within 0.25 miles of spotted owl sites (documented or projected) between 1 March and 30 June (or until two weeks after the fledging period) unless substantial smoke will not drift into the nest stand.

D. To minimize the number of potential spotted owl nest trees used for instream structures, only the following sources will be used:

(I) Trees already on the ground in areas where large woody material is adequate;

(II) Trees that lack structural conditions (snags, cavities) suitable for spotted owls.

Appendix A-1. Mandatory Restriction Distances to Avoid Disturbance to Spotted Owl Sites

Activity	**Buffer Distance Around Owl Site**
Heavy Equipment (including non-blasting quarry operations)	105 feet
Chain saws	195 feet
Impact pile driver, jackhammer, rock drill	195 feet
Small helicopter or plane	360 feet*
Type 1 or Type 2 helicopter	0.25 mile*
Blasting; 2 lbs. of explosive or less	360 feet
Blasting; more than 2 lbs. of explosives	1 mile

***** If below 1,500 feet above ground level

Above-ambient noises further than these Table B-1 distances from spotted owls are expected to have either negligible effects or no effect to spotted owls. The types of reactions that spotted owls could have to noise that the Service considers to have a negligible impact, include flapping of wings, the turning of a head toward the noise, hiding, assuming a defensive stance, etc. (USFWS 2003).

Recommended PDC

A. No NRF habitat removal will occur within 0.25 miles of any documented or generated owl site from March 1 through September 30, or until two (2) weeks after the fledging period, unless protocol surveys have determined owls are not present, are non-nesting, or nesting has failed.

B. Minimize the use of fire line explosives within one (1) air mile of occupied stands from March 1 through June 30, or until two (2) weeks after the fledging period, unless protocol surveys have determined owls are not present, are non-nesting, or nesting has failed.

Appendix B: Small Diameter Thinning (Stewardship) Treatments

Table 3. Small Diameter Treatment Types

Treatment No.	Treatment
1 MC < 80 years old Moist sites	Target RD for CF ≥ 8" DBH will be 35% resulting in leaving an average BA of 120 to 140, or 123 to 154 CF per acre with an average DBH of 12"-14". In areas where the RD in CF ≥ 8" DBH is less than 35%, CF between 1.5' tall and 7.9" DBH will be retained and spaced 15' from existing CF. Ten to 15% of each unit will be left in un-thinned patches and small openings ranging in size from 0.1 acre to 0.25 acre.
2 MC ≥ 80 years old Moist sites	Target RD for CF ≥ 8" DBH will be 35% with all trees ≥ 16" DBH being left. This will result in leaving an average BA of 120 to 140, or 84 to 100 CF per acre with an average DBH of 16"-18. In areas where the RD in CF ≥ 8" DBH is less than 35%, CF between 1.5' tall and 7.9" DBH will be retained and spaced 15' from existing CF. Ten to 15% of each unit will be left in un-thinned patches and small openings ranging in size from 0.1 acre to 0.25 acre.
3 MC & HW < 80 years old Moist sites	Target RD for CF and HW ≥ 8" DBH will be 35% resulting in leaving an average BA of 120 to 140, or 123 to 154 trees per acre with an average DBH of 12"-14". In areas where the RD in CF and HW ≥ 8" DBH is less than 35%, CF between 1.5' tall and 7.9" DBH and HW between 4" and 7.9" DBH will be retained and spaced 15' from existing CF and HW. All HW < 4" DBH will be cut. Ten to 15% of each unit will be left in un-thinned patches and small openings ranging in size from 0.1 acre to 0.25 acre. A minimum of 3 to 5 of the larger HW/ac will be retained with BO being the preferred leave species.
4 MC & HW ≥ 80 years old Moist sites	Target RD for CF and HW ≥ 8" DBH will be 35% with all trees, including HW, ≥ 16" DBH being left. This will result in leaving an average BA of 120 to 140, or 84 to 100 trees per acre with an average DBH of 16"-18. In areas where the RD in CF and HW ≥ 8" DBH is less than 35%, CF between 1.5' tall and 7.9" DBH and HW between 4" and 7.9" DBH will be retained and spaced 15' from existing CF and HW. All HW < 4" DBH will be cut. Ten to 15% of each unit will be left in un-thinned patches and small openings ranging in size from 0.1 acre to 0.25 acre. A minimum of 3 to 5 of the larger HW/ac will be retained with BO being the preferred leave species.
5 MC < 80 years old Dry sites	Same as Treatment 1 except the target RD will be 25% resulting in leaving an average BA of 80 to 100, or 88 to 110 CF per acre with an average DBH of 12"-14".
6 MC ≥ 80 years old Dry sites	Same as Treatment 2 except the target RD will be 25% resulting in leaving an average BA of 80 to 100, or 60 to 72 CF per acre with an average DBH of 16"-18.

Table 3. Small Diameter Treatment Types	
Treatment No.	Treatment
7 Pine All sites < 80 years old	Target RD for CF ≥ 8" DBH will be 25% resulting in leaving an average BA of 80 to 100, or 88 to 110 CF per acre with an average DBH of 12"-14". Three of the larger HW/ac will be retained with BO being the preferred leave species. These HW will be ignored in the 25% RD target CF between 1.5' tall and 7.9" DBH will be retained at a 15' x 15' spacing ignoring the CF ≥ 8" DBH in the spacing.
8 HW < 80 years old Thinning	Target RD for HW ≥ 8" DBH will be 30% resulting in leaving an average BA of 100 to 120, or 150 to 200 HW per acre with an average DBH of 10"-12" in a clumpy pattern instead of strictly a spacing pattern. Where available BO will be favored over other HW species. Healthy, full crowned, co-dominate and dominant CF will be favored over HW. In areas where the RD in HW ≥ 8" DBH is less than 30%, HW between 4" tall and 7.9" DBH will be retained and spaced 15' from existing HW. Any CF < 8" DBH will be thinned to a 15 X 15' spacing and have preference over HW as leave trees. All HW < 4" DBH will be removed.
9 HW ≥ 80 years old Regen Cut	All trees ≥ 16" DBH will be left. Regenerate with the group selection regeneration method by creating 0.5 to 1 acre openings over 20% of the area by removing all HW < 16" DBH. When present, all desirable CF 8" to 16" will be left in the openings up to a maximum BA of 120. Desirable CF 1.5' tall to 7.9" DBH will be left at a 15' X 15' spacing. In between the openings treat the same as for treatment 8 except all trees ≥ 16" DBH will be left resulting in leaving an average of 110 to 150 HW per acre with an average DBH of 12"-14".

Definition of abbreviations

BA = basal area BO = black oak CF = conifers DBH = diameter breast height HW = hardwoods
MC = mixed conifer RD = relative density

Riparian tree and brush species (big leaf maple, hazel, oceanspray, willow, alder, dogwood, ninebark, vineleaf maple) will not be treated within riparian reserves.

Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions

Version 2.0

(Version 2.0 replaces the September 14, 2007 document)

Prepared by:
USDI Fish and Wildlife Service
USDI Bureau of Land Management
USDA Forest Service

September 15, 2008

Suggested Citation: USDI Fish and Wildlife Service, USDI Bureau of Land Management and USDA Forest Service. 2008. Methodology for estimating the number of northern spotted owls affected by proposed federal actions. Version 2.0. Oregon Fish and Wildlife Office, Fish and Wildlife Service, Portland, OR.

Summary

Note to User: Information and guidance provided herein supersedes earlier versions of this document.

On February 16, 2007, the Ninth Circuit Court rendered a decision in the ONRC v. Allen case that invalidated the Incidental Take Statement (ITS) of a U.S. Fish and Wildlife Service (FWS) Biological Opinion that covered all FS and BLM timber harvest activities affecting the northern spotted owl in the Rogue Basin, Oregon for Fiscal Years 2002-2003. The Court concluded the ITS was arbitrary and capricious because: (1) the underlying Biological Opinion had been withdrawn; (2) the ITS failed to provide a numerical limit on take of the spotted owl without explaining why such a limit is impractical to obtain and employ; and (3) the ITS did not provide an adequate trigger for reinitiation of consultation.

In response to the 9th Circuit Court, spotted owl specialists from Region 1 of the FWS, the OR/WA State Office of the Bureau of Land Management (BLM), and Region 6 of the Forest Service (FS) developed a methodology for quantifying and monitoring incidental take of the northern spotted owl that addresses the 9th Circuit's decision. The methodology estimates the number of northern spotted owl home ranges that are likely to occur within the area affected by a proposed Federal action, based on the amount and distribution of suitable owl habitat and best available information on known owl locations and spacing patterns for that area. In particular, the methodology relies upon known spotted owl locations derived from surveys as the foundation for a "northern spotted owl occupancy" map. We believe the methodology provides a reasonable basis for the FWS to assess anticipated incidental take of the spotted owl caused by a proposed Federal action and includes procedures for monitoring take-related effects such that reinitiation of consultation can be triggered, as appropriate, prior to completion of the action. The methodology was reviewed by agency biologists responsible for the application of the methodology along with leading spotted owl researchers. Their comments were considered in finalizing this document.

BLM and FS Administrative Unit Staff and Level 1 Teams are encouraged to follow this methodology when assessing effects, and implementing and monitoring projects in situations where no or only partial spotted owl survey information is available for the analysis area. If current survey information is available, it represents the best available information and should be used to assess the effects of a proposed action on the spotted owl. Information derived from the methodology described herein should be included in the Biological Assessment and will assist the FWS in evaluating the potential for incidental take of spotted owls to be included in a Biological Opinion, as appropriate. Appendix 1 provides the scientific background in support of the methodology. A glossary of terms is also provided near the end of this document.

It should be noted that the northern spotted owl is one of the most studied species in the world. In developing this methodology, we have relied on the tremendous body of research available; however, for some of the specific questions we are trying to address, the information is limited. Therefore, we view the resulting methodology as an iterative process and anticipate updating the method(s) and its application as new information becomes available. The methods employed here are unique to the northern spotted owl and are likely not readily transferable to other listed species.

Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions[1]

The following procedures are intended to reasonably estimate the number of northern spotted owls (*Strix occidentalis caurina*) that are likely to occur within the area affected by a proposed Federal action (in consultation terms, the "action area") for the purpose of completing effect determinations in Biological Assessments (BAs) under informal consultation and jeopardy analyses and incidental take assessments in Biological Opinions (BiOps) under formal consultation. This information will be used to characterize, in part, the Environmental Baseline, Effects of the Action, and Cumulative Effects sections of a BiOp, and the amount of take, if any, exempted in an Incidental Take Statement (ITS).

This methodology provides a quantitative basis to express the anticipated incidental take of the spotted owl caused by a proposed federal action for purposes of take exemption and monitoring.

Spotted owl survey information plays an integral part in estimating the number of northern spotted owls affected by proposed Federal actions. In designing the estimation process, the BLM, FS, and the FWS relied on number and distribution data for spotted owl locations from demographic studies and other administrative owl survey data sets. These data, when combined with information on owl-landscape habitat configurations, facilitate the projection of likely spotted owl occurrence patterns across the landscape. The estimation process described below uses known spotted owl locations as the basis for the assessment and supplements any known locations with projected locations derived from the habitat analysis of spotted owl sites from similar areas within the owl's range. Using the projected owl locations solely, or in concert with known locations, facilitates estimating the number of northern spotted owls affected by proposed federal actions and obviates the need to conduct owl surveys specific to each of the proposed actions.

The biological basis for this methodology relies on information related to known spotted owl locations, habitat spatial relationships and distribution.

Project-specific spotted owl survey data, in some cases, may be not sufficient to estimate the number and distribution of spotted owls within a given area due to the negative effects that barred owl presence may have on the response of spotted owls during calling surveys, and other factors that may decrease spotted owl detectability such as weather and breeding status. For that reason, the northern spotted owl occupancy map (NSOOM) provides a more comprehensive estimate of the number of owls that are likely to occur in the area affected by a proposed Federal action because it includes both known spotted owl locations and projected locations. Please see Appendix 1 for additional information regarding the development of the NSOOM.

The NSOOM does not replace surveys. Surveys are encouraged to help inform project planning and preclude the need for relying on computer-generated points.

[1] For example, land management activities involving timber harvest or fuels reduction, and those that may cause above-ambient noise levels that may affect the spotted owl.

A. Estimating the Number of Spotted Owl Home Ranges that may be Affected by Proposed Actions

Step 1: Define the analysis area.

(a) Map the estimated geographic location of proposed actions.

Delineate the boundaries of proposed actions in a GIS shapefile using the best available planning information. The shapefile should have an accompanying attribute table that could include the unit name, size (acres), type of activity, and type of impact(s) to the spotted owl (Table 1). For projects that potentially cover large areas (e.g., aerial applications, roadside salvage, etc.) consider creating multiple smaller units and delineate these in the GIS shapefile for the purposes of this analysis. It is recognized that both project location and the extent of affected acres are sometimes not fully defined at the time of consultation. Therefore, it is anticipated that the Administrative Units will, in some cases, rely on past consultation/planning as a guide to approximate the size and location of proposed actions for the purpose of completing consultation. It is expected that all specialists (i.e., fire, silviculture, timber, wildlife, etc.) will make contributions to mapping the proposed actions, thus, this effort should not rely entirely on one person "approximating" these areas.

Table 1. An example of information to be included in the attribute table of the GIS shapefile for proposed actions[2].

Actions/Unit	Acres Impacted	Activity Type	Impact	NSO site #
A	35	Variable density thinning	NRF habitat-maintained	0052
B	25	Understory Thinning	Dispersal habitat-maintained	3569
C	10	Regeneration harvest	NRF removed	0039
Etc.				

[2] For example, by using the IDENTIFY tool in ArcMAP, clicking on the proposed action location could display the unit name, acres impacted, treatment type and the type of impact to spotted owl habitat. For efficiency, projects can be set up for users in the GIS such that holding the computer's cursor over a given unit will display pertinent information from the attribute file.

(b) In the GIS shapefile, overlay a circle with a diameter of one spotted owl provincial home range on each proposed action/unit.

The resulting polygon(s) buffers the analysis area within which spotted owls may be affected (Figure 1 and Table 2). The GIS shapefile containing the action/unit and provincial home range circles should be included as part of the BA.

Figure 1. This figure shows an example of the extent of an analysis area using the composite of home-range diameter circles (Table 2) around proposed timber harvest units. Darker shaded (green) areas represent spotted owl habitat derived from the BioMapper product (Davis and Lint 2005 *in* Lint 2005 GTR-648).

Step 2: Identify spotted owl habitat within the analysis area.

(a) Federal Lands

Overlay the analysis area developed under Step 1 with your best available spotted owl habitat map layer. This layer is likely the Administrative Unit spotted owl habitat layer. Whatever habitat layer that is being used should be updated, as possible, to reflect current habitat conditions.

(b) Non-Federal Lands

Should the habitat condition on non-federal lands be analyzed for the Biological Assessment? Yes, albeit depending on the amount of non-federal ownership within affected northern spotted owl home ranges.

In the past, BAs/BiOps have assumed that no suitable spotted owl habitat occurs on non-federal lands for the consultation analysis. This "worst-case" scenario was used because it is difficult to know the current land-use planning status of owl habitat on non-federal lands within an action area. However, we acknowledge that there are situations where there is sufficient habitat on non-federal lands that if not considered would lead to the possibility of overestimating adverse effects (and take) on spotted owls caused by proposed federal actions.

To address the issue of assessing habitat conditions on non-federal lands that contribute to northern spotted owl home ranges on federal lands, the following guidance is provided.

All (federal and non-federal) acres of suitable habitat within the provincial home range radius of an affected owl activity center location on the NSOOM will be used to assess effects to individual owls. The BA will identify the owl activity centers affected by the proposed federal action and describe the amount of suitable habitat present on federal and non-federal lands before and after the proposed action for the three scales of analysis (i.e., nest patch, core and home range) specified in this methodology. The action agency will also specify the proportion of federal and non-federal acres for each of the analysis scales for each of the affected owl activity centers. For those activity centers with non-federal lands, the action agency will provide an estimate of the amount of suitable habitat on non-federal land using the best information available (e.g., BioMapper data used to develop NSOOM updated with most recent change data or other data as available). The BA will provide a tabular summary of the acres of suitable owl

habitat on federal and non-federal lands for the three analysis scales for pre and post proposed action scenarios.

In the process of preparing the BiOp for the proposed actions, the Service will consider the information provided in the BA on the amount of suitable habitat on both federal and non-federal lands when assessing whether the effects of the federal proposed action will rise to the level of take for any individual spotted owl.

Example Table. Extent of federal and non-federal land and NRF habitat within NSO home ranges in the action area. Additional columns can be added to the table to reflect analysis needs.

MSNO	Federal Land (acres & %)	Non-Federal Land (acres & %)	Federal Land NRF habitat (acres & %)	Non-Federal Land NRF habitat (acres & %)

As always, if formal consultation is required, the Cumulative Effects section of the BiOp will discuss the role of any suitable spotted owl habitat on non-federal land and any Endangered Species Act (ESA) compliance obligations on those lands within the action area.

As discussed in Appendix 1, habitat and known owl sites on non-federal lands will be used in the development of the NSOOM. This habitat layer is available via the biomapper product (Davis and Lint 2005) and is used due to its provincial scale coverage.

Is dispersal-only spotted owl habitat considered in the ITS methodology? No. The ITS methodology is focused on spotted owl nesting, roosting and foraging (NRF) habitat. Therefore, dispersal-only habitat is not used in the NSOOM nor is it used to examine effects under this methodology. Continue to examine effects to dispersal habitat as you have in the past.

Step 3: Select the position of spotted owl site centers within the analysis area.

As part of applying this methodology, Administrative Units will be asked to develop a GIS shape file of spotted owl sites on their unit. This shape file will include those sites where the Administrative Unit determines there is a reasonable likelihood that spotted owls occupy the sites. Site selection will depend on survey information, knowledge of barred owls, and/or owl habitat alterations since the last survey. This methodology relies on the Thomas et al. (1993: FEMAT IX-25) definition of a spotted owl site: "Any site where there has been a recent or historic observation of a resident single spotted owl or a pair of owls." It will be the discretion of the administrative unit to define historical sites.

The spotted owl site layer (see above) the Administrative Units provide will serve as the foundation for the NSOOM for the action area. However, the NSOOM will also include computer-projected sites within likely occupied habitat (see below and Appendix 1).

Administrative Units may lack some confidence in the status of owl occupancy at some historic sites they include, and may therefore want to consider to defaulting to a computer-projected site instead in their effects analysis. In considering whether to use historic spotted owl sites in the development of the NSOOM, it should be noted that data collected in many of the demographic study areas show that on an annual basis as many as 60% of historic owl sites are occupied by spotted owls (unpublished annual reports by Anthony et al. and Forsman et al.). Additionally, on the Tyee demography study area in the Oregon Coast Ranges, 85 spotted owl sites were documented based on surveys prior to 1995. In 2005, those sites were resurveyed and spotted owls were detected within 400 m of where they were detected a decade ago at 60% of the sites (Lint unpublished data).

In some portions of the spotted owl's range, "effects of the action" analyses rely on the output of predictive owl occupancy models (e.g., California Klamath Province, Zabel et al. 2003) in the absence of surveys. We recommend continued use of these models.

What about the influence of barred owls and those spotted owl sites with relatively low habitat amounts? How is this information considered in selecting spotted owl sites and the development of the NSOOM? Both barred owls and relatively poor sites are taken into consideration in the process (see discussion below).

The ITS Team acknowledges the negative effects of barred owls on detection and occupancy rates of spotted owls (Courtney et al. 2004, 2008, Olson et al. 2006, and Crozier et al. 2007). Based on this information, the administrative units have been asked to consider the barred owl influence in their selection of occupied sites for this process. The ITS Team does not know to what extent spotted owl sites have been deleted from administrative unit spotted owl maps due to barred owls but believes very few sites were deleted. As a result, the ITS Team considers the methodology provides a liberal estimate of spotted owls for the purposes of estimating effects and take.

The ITS Team is also aware that some northern spotted owl sites, in particular, those sites located in the checkerboard pattern of BLM and non-federal lands have relatively low amounts of NRF habitat. The ITS methodology takes into account known spotted owl presence in these habitat conditions in that at least 90% of the sites are utilized to parameterize the NSOOM. This resulted, in some cases, in having as little as 17% NRF habitat (federal and non-federal, combined) at the home range scale (Table 5) being used to map likely occupied habitat. Therefore, spotted owls at the lower end of habitat conditions were utilized in this effort.

What level of spotted owl survey is needed for project planning? At a minimum, surveys should be conducted in accordance with the USFWS Northern Spotted Owl Survey Protocol (1992). Given the potential negative consequences of barred owl presence on spotted owl response rates, an update to the protocol is planned that will address the barred owl effect. Until this update is complete, continue to use the 1992 protocol.

Northern Spotted Owl Occupancy Map (NSOOM)

Computer-generated spotted owl sites

Both known spotted owl sites provided by the administrative unit and computer-generated spotted owl points are used as part of the process for quantifying take. The computer-generated points are used for areas with incomplete or no spotted owl survey information and are developed from spotted owl habitat relationships, nearest-neighbor distance, and density information from spotted owl demographic study areas, from the same province in which the BA/BiOp occurs (Appendix 1). The computer-generated points are placed randomly on the NSOOM within geographic areas satisfying the amount and spatial distribution of habitat along with the nearest-neighbor criteria associated with known owl sites. While the spatial distribution of the computer-points is random, the overall carrying capacity for the map area remains similar with each simulation.

Should computer-generated points be used to inform project planning? No. Computer points are based on a simulation that may not reflect actual spotted owl locations on the landscape. Again, the purpose of the computer-generated points is to estimate spotted owl numbers and distribution within unsurveyed habitat based on factors known to influence the carrying capacity of a given area for spotted owls for purposes of assessing the effects of a proposed Federal action on this species.

Should computer-generated sites be tracked through time? Computer points should be tracked for the term of the action(s) covered by the BA/BiOp and monitoring process. A different set of computer points may be generated for future actions covered by a BA/BiOp in the same map area if significant changes have occurred to the baseline conditions. This would result in the tracking of these points for the term of the actions covered by that BA/BiOp and subsequent monitoring activities.

Can elements of the ITS methodology be used to plan projects that avoid or minimize adverse effects to spotted owls? Yes. There are several elements of the ITS methodology that one can use to plan projects and minimize adverse effects to spotted owls. These elements include: 1) using your administrative unit's known spotted owl sites and suitable habitat layer and/or 2) using the NSOOM map which provides the general geographic area(s) where the amount and spatial distribution of likely occupied spotted owl habitat occurs out to the home range scale. One could also use their Unit's habitat layer and model nest patch and core area habitat, similar to the NSOOM process. This would result in a map of relatively higher quality habitat. For each of these elements, one would plan and design projects for the site specific conditions and outside of the mapped areas to avoid and/or minimize adverse effects to spotted owl habitat.

How are disturbance-related effects treated under this methodology? During the development of this methodology, Administrative Unit/Level 1 team meetings were held. Varied and appropriate ways of analyzing and protecting known spotted owl sites from disturbance

effects were discussed. The ITS Team supports the continued use of these approaches. For the computer generated sites, the ITS Team suggests a similar analytical approach for assessing effects of proposed actions. That is, the computer point and the surrounding activity-related distance should be assessed. Activities that occur during the critical breeding season and within the disturbance distance threshold for an activity may warrant likely to adversely effect determinations.

How can a project be planned to avoid adverse effects from disturbance? The following suggestions would help minimize adverse effects and may result in not likely to adversely affect determinations.

- Avoid siting projects near known spotted owl sites.
- Avoid siting projects within or immediately adjacent to NRF habitat.
- Avoid conducting activities within the critical breeding period for the spotted owl and within the disturbance distance threshold at known or computer generated owl sites.

For what length of time is a NSOOM valid? An occupancy map will be valid for the term of the action covered by the concurrence letter or BiOp, including any associated monitoring activities. Level 1 Teams will help determine if NSOOM updates are needed, based on stochastic events or new spotted owl survey data.

Can the NSOOM be used multiple times? As discussed above, the NSOOM is valid for monitoring the action(s) considered in the BiOp or Concurrence Letter for the term of the covered action. The NSOOM can also be used for effect analyses of other proposed actions, provided the baseline habitat hasn't changed significantly since the map was developed. Currently, we do not have the administrative and technological capacity to make annual changes to the NSOOM. However, for each new BA, a new NSOOM should be developed if baseline changes are significant and/or to provide a new set of computer-generated points for assessment purposes (see below). Deviations to this guidance can occur based on Level 1 discussions and decisions.

Who is responsible for the overall maintenance of information used to apply the ITS methodology? The interagency ITS Team envisions that most of the maintenance of information for the ITS methodology would be accomplished by Level 1 Teams. Here, Level 1 Teams would be responsible for edge-matching maps (see Glossary), making decisions on which known and computer sites to include or delete, tracking habitat conditions at sites, and making adjustments to local habitat definitions for purposes of completing consultation. Any revised maps and or other related products should be archived with the USFWS Level 1 representative. The ITS Team strongly encourages Level 1 teams to have at least one meeting a year to discuss all aspects of implementing the ITS methodology and to provide any of their concerns to the ITS Team.

Who is responsible for producing the NSOOM? It will be the responsibility of the interagency ITS Team to generate new versions of NSOOMs and update the ITS Methodology

document as new habitat or owl location information becomes available. New NSOOMs would be the result of having newer provincial habitat maps that come on-line through the NW Forest Plan monitoring program and/or a new consultation being initiated. In addition, as information becomes available, the ITS team will provide additional effects determination guidance, as appropriate. However, as pointed out in the text box above, depending of the level of new information (e.g., no significant changes in habitat baseline or number of spotted owl sites, new NSOOM may not need to be generated for each consultation. Level 1 Team will have discretion over this and advise the ITS team.

It is anticipated that future NSOOMs will be generated at a provincial rather than an Administrative Unit scale, as was done in 2007. Developing the NSOOM on a provincial scale should minimize the need to "edge-map" sites along administrative boundaries. However, this will require the Administrative Units to have their known site layer current on an annual basis. Also, the need to edge map computer points is not required because they are not treated like a known site, from a long-term point of view. These factors should help reduce the workload. When an Administrative Unit is ready to submit a BA, that is, they have a project planned and effects determined to at least their known sites, they will request a NSOOM from the ITS Team. In response, a NSOOM will be developed for the province, with a clipped version to the Administrative Unit. Once received, the unit will be able to assess effects of the proposed action based on the computer points, and finalize the BA. This process of clipping from the provincial map to Administrative Units will be repeated on an as needed basis, and should reduce work load for all involved.

How do I move a generated point on the NSOOM? When NSOOMs are developed, some of the computer-generated owl sites may not coincide with the suitable owl habitat layer used by an Administrative Unit. This is due largely to the NSOOM being developed on a remotely-sensed, pixel-based habitat map whereas most Administrative Unit habitat maps are raster-based, polygon maps and an artifact of GIS neighborhood calculations. If generated points do not coincide with spotted owl suitable habitat on an Administrative Unit's suitable habitat map, the following procedure can be used for moving a generated owl point into suitable habitat.

First, check to make sure your historic owl sites occur within your suitable habitat polygons. Second, don't consider the location of the proposed action when moving a generated owl point to avoid biasing the placement of that point. Next, move the generated point to the nearest patch (at least 15 to 20 acres in size) of suitable owl habitat taking into account the nearest-neighbor distance (Table 5) for the province. Keep this distance in mind and adhere to it as closely as you can. Once you have completed these steps, place the generated point at least 200 meters in from the stand boundary to reflect an "interior" location of spotted owl nest trees. Lastly, adjust the generated point, as needed on other factors such as proximity to streams, ridges, etc. When moving a generated point, consider the historic locations of owls in the vicinity to aid in deciding which stand to move the point to or where in a stand to place a point. The historic owl location data, in this case, would be owl sites that have not had owls for a long time such that Administrative Units elected not to use them on the NSOOM. These sites are useful in this context because they provide information about where an owl activity center was located at one time in the vicinity where you are considering moving a point.

Step 4: Delineate potentially affected spotted owl home ranges in the analysis area.

Implement this step using known and generated spotted owl sites on the NSOOM and encompass them using the appropriate provincial home range diameter (Table 2). Any home range subject to removal of suitable habitat or above ambient noise levels caused by the proposed action is an affected home range (Figure 2).

Table 2. Northern spotted owl median home range radius, area, and diameters and mean core area radius and area by physiographic province.

Province	Median Home Range Radius and Area	Median Home Range Diameter	Mean Core Area Radius and Area
Olympic Peninsula, WA	2.7 miles = 14,271 acres (Thomas et al. 1990) and Courtney et al. 2004); 40% = 5,708 acres.	5.6 miles	1.4 miles = 5,720 acres (Forsman et al. 2006); 50% = 2,860 acres.
Washington Cascades	1.8 miles = 6,657 acres (Thomas et al. 1990 and Courtney et al. 2004); 40% = 2,663 acres.	3.6 miles	0.7 miles = 1000 acres (Thomas et al. 1990 and Courtney et al. 2004); 50% = 500 acres.
Oregon Coast Ranges	1.5 miles = 4,523 acres (Thomas et al. 1990 and Courtney et al. 2004); 40% = 1900 acres.	3 miles	0.5 miles = 500 acres (Irwin et al. 2005, Glenn et al. 2004, Carey et al. 1992); 50% = 250 acres.
Oregon Cascades	1.2 miles = 2,955 acres (Thomas et al. 1990 and Courtney et al. 2004); 40% = 1,182 acres.	2.4 miles	0.5 miles = 500 acres (Swindle et al. 1999 and Irwin et al. 2000, 2005); 50% = 250 acres.
Klamath Province	1.3 miles = 3,340 acres; 40% = 1,336 acres (Thomas et al. 1990 and Courtney et al. 2004).	2.6 miles	0.5 miles = 500 acres (Wagner and Anthony 1998, Dugger et al. 2005, Zabel et al. 2003, Bingham and Noon 1997); 50% = 250 acres.

Based on our review of available literature, refined estimates of spotted owl core areas are now available and are different than historic (1990) FWS documents evaluating adverse effects. Potential changes include increasing the historic 0.7-mile core area radius to 1.4 miles for the Olympic Peninsula Province and reducing the historic 0.7-mile core area radius to 0.5 miles for the Cascades, Coast and Klamath Provinces in Oregon. The suitable habitat percentages provided in Table 2 are approximate for assessing incidental take; the rationale for these guidelines is presented in the "Rationale for Effects Determinations" section below. Use of revised core area sizes, for assessing take, should be discussed and agreed to by Level 1 teams.

Figure 2. Delineation of spotted owl home ranges (outer circles) and core areas (inner circles) around spotted owl site centers and project locations. Green denotes suitable habitat.

The area encompassing the affected home ranges represents the action area, which represents the area directly and indirectly affected by a proposed Federal action. Use this information to develop the Environmental Baseline section of the BA and, if appropriate, the BiOp.

Step 5: Identify the effects of the proposed action; estimate the number of spotted owl sites and computer points within the action area that may be adversely affected by the proposed action and document the results in the BA.

Step 1 generated a footprint of project locations, Step 2 generated a map of suitable owl habitat and Step 4 generated a footprint of likely occupied spotted owl habitat and spotted owl sites (historic and computer-generated) within the area affected by proposed actions/units. In this step, an estimate of the number of spotted owl sites within the action area that may be affected by the proposed Federal action is made. Based on the guidance below, separate the affected owl sites/home ranges into those that are Not Likely to be Adversely Affected (NLAA) and those that are Likely to be Adversely Affected (LAA) by the proposed action; provide the information in a table (Table 3) in the BA. The discussion below provides guidance on effects determinations.

Table 3. An example of tabular format for presenting information on site-specific effects to northern spotted owl sites, both known and those based on computer-generated points.

	Home Range (see Table 2)			**Core Area (see Table 2)**			**Nest Patch (70 acres - .175 mile radius)**			**Effects**
ID	Current NRF acres (%HR)	Harvest acres	Post NRF acres (%)	Current NRF acres (%core)	Harvest acres	Post NRF acres (%)	Current patch acres	Harvest acres	Post NRF acres (%)	NLAA or LAA?

How should the analysis of computer-generated owl points be used in a BA and a BiOp? The BA should include a discussion of the environmental baseline conditions for the spotted owl and the effects of the proposed action on the spotted owl. The baseline discussion should acknowledge: the number and distribution of known spotted owls in the action area; the amount, quality, and distribution of suitable spotted owl habitat in the action area; and a habitat map, among other items. The effects of the proposed action discussion in the BA should consider both known spotted owl sites and computer-generated points. The same approach should be used in the BiOp and the ITS.

Spotted owls need a certain amount of suitable habitat within their home range to provide the resources necessary to meet essential life functions [Thomas et al. 1990, Courtney et al. 2004, Seattle Audubon Society et al. v. Sutherland et al. Civ. No. C06-1608MJP (D.W. Wa August 1, 2007)]. As the amount of suitable habitat in an owl's home range decreases, so does site occupancy, reproduction and survival (Courtney et al. 2004). The question of how much habitat is enough is difficult to answer. In developing this methodology, we relied on the available science (see references below) and a Washington District Court ruling (cited above) to help establish guidance on assessing take of spotted owls related to habitat modification activities. We recognize that the habitat thresholds provided below are not a bright-line rule.

Nest Patch

Nest area arrangement and nest patch size have been shown to be an important attribute for site selection by spotted owls. More specifically, when using nesting habitat, models developed by Swindle et al. (1997, p.52) and Perkins et al. (2000) showed that the 200-300 meter radius (and sometimes greater), encompassing approximately up to 75 acres, around a nest is important to spotted owls and having as much of the 300-meter radius area in suitable habitat was critical to nest position on the landscape. Coincidentally, Miller et al. (1989) found that on average, the extent of forested area used by juvenile owls prior to dispersal averaged approximately 70 acres. Lastly, Meyer et al. (1998) found that old-growth patch size (i.e., larger patches) was strongly related to spotted owl site selection in Oregon. Based on the above, the ITS has concluded that it is likely that removal of NRF or dispersal-only habitat within a 300-meter radius of a nest patch would cause adverse effects and could, depending upon the extent of the removal, likely constitute take of spotted owls in the form of harm (see below). Based on the above information, the nest patch is defined herein as the 300-meter radius area around a known or likely nest site. Previous ITS documents have used a 200 meter radius area around sites; the change to 300 meters is based on the ITS team's further investigation into spotted owl habitat relationships using the documents cited in this nest patch section.

As this methodology has been implemented, questions have arisen regarding the effects of thinning NRF and dispersal-only habitat on the spotted owl. The ITS Team has reviewed the available information on this topic (Glenn et al. 2004, Meiman et al. 2003, Irwin et al. 2005, Pearson 2007 and Roseburg BLM Biological Assessment 2008). Based on that review, the ITS Team has concluded that any commercial thinning activities within a 300-meter radius of a known or likely nest site would likely cause adverse effects to, and may rise to the level of take of the northern spotted owl. The primary basis for this conclusion was the management recommendations provided by Glenn et al. (2004) and Meiman et al. (2003) for a no-harvest (which includes thinning)strategy in the immediate area of a spotted owl nest site and the complimentary information provided in the nest patch section herein.

Best available information indicates that two key elements of spotted owl habitat within a nest patch (defined as a 300-meter radius around an owl point on the NSOOM) are: (1) canopy cover of dominant, co-dominant, and intermediate trees (conifers and hardwoods); and (2) the amount of down wood (Thomas et al. 1990, Hershey 1995, and Courtney et al. 2004). Proposed management activities in forest stands likely to be used by spotted owls that are designed to retain the current condition of these elements within a nest patch and that are implemented

during the non-breeding period will reasonably warrant a not likely to adversely affect (NLAA) determination for the spotted owl. Examples of these activities include planting, road decommissioning, trail and road maintenance, culvert replacement, manual vegetation maintenance, special forest product removal, limited hazard tree removal, and possibly, some fuels reduction treatments to reduce fire risk. However, site and action-specific situations may warrant a different effect determination for these types of actions, and should be evaluated on a case-by-case basis by the local biologist. In cases involving salvage of dead-standing and down trees after blowdown and wildfire events, some tree removal may also qualify as a NLAA determination for the spotted owl depending upon the specific situation. Activities in non-habitat, could also qualify for NLAA determinations.

In making the effect determination, consideration should be given to whether the proposed action is likely to impact (1) owl prey habitat, (2) the quantity and quality of thermal and hiding cover, (3) nesting substrate availability, and (4) roost tree availability within the nest patch to an extent that it would disrupt the normal use of the nest patch for breeding, feeding and shelter by spotted owls. If so, a determination of LAA would be warranted.

Please note, and as indicated below for the Core and Home Range scales, light –thinning of NRF and dispersal-only habitat that maintains a similar stand function pre- and post-thinning would likely warrant a NLAA determination, however, if in the judgement of the local biologist, the amount of available habitat being treated covers a large portion of the area, it may warrant a LAA determination.

Core Area

The BLM/FS/FWS team that developed this methodology relied on numerous studies to ascertain spotted owl core area size by province. Some recent information (Table 2) suggests the need for adjusting (decreasing or increasing) core area size from the 0.7-mile radius that was historically used by the FWS to evaluate take of the spotted owl.

Habitat composition within a core area is also important to spotted owls and helps define the core area size mentioned above. Historically, the 0.7-mile core area value was based on the finding of Thomas et al. (1990) that areas with > 500 acres of suitable habitat are more likely to have spotted owls than areas with < 500 acres of habitat. These results indicate the value of older forest, but not necessarily how much old forest. Several recent studies have provided new information that further informs the definition of a spotted owl core area. For example, Bingham and Noon (1997) reported that a spotted owl core area is the area that provides the important habitat elements of nest sites, roost sites, and access to prey, benefiting spotted owl survival and reproduction. Rosenberg and McKelvey (1999) reported that spotted owls are “central place” animals with the core area (the area closest to the nest) being the focal area. Results from Bingham and Noon (1997) showed that spotted owls typically used 20-21 percent of their home range as core area habitat, which generally included 60-70 percent of the sites within their home range used during the breeding season.

Recently developed habitat-fitness and landscape models have demonstrated the importance of habitat amount within core areas. For example, Meyer et al. (1998) examined landscape indices associated within spotted owl sites versus random plots on BLM lands throughout Oregon. Across provinces, landscape indices highly correlated with the probability of spotted owl occupancy included the percent older forest (30 percent) within the 500 acres surrounding the site. Zabel et al. (2003) found for their northwest California study that the highest probability of owl occupancy occurred when the core area was composed of 69 percent nest/roosting habitat. Bart (1995) found that core areas should contain 30-50 percent mature and old growth forest. Franklin (pers. comm.) found that the proportion of good to medium to lesser quality habitat for owl cores in northwest California was approximately 60:30:10 percent. Lastly, Dugger et al. (2005) showed that when owl core areas in their southern Oregon study area had at least 50-60 percent older forest habitat, spotted owl fitness (i.e., survival and reproduction) was relatively higher than in core areas with lesser amounts.

In summary, habitat composition in owl core areas varies by region and study, ranging from a low of 27 percent to a high of 78 percent (mean 43%, 14 SD). Based on the above studies, 50 percent or higher cover of suitable habitat within a 0.5 mile radius should be considered as necessary to maintain spotted owl life history functions. We chose 50 percent because this lower value is where an effect of significant impairment of spotted owl life history functions is most likely to occur. We relied largely on the research conducted by Dugger et al. (2005), including unpublished habitat-fitness models, to ascertain this value. Light-to-moderate thinning types of actions that maintain the extent and function of NRF habitat within a core area are generally not likely to have adverse effects to spotted owls, although site-specific conditions will factor into this determination.

Home Range

The BLM/FS/FWS team that developed this methodology reviewed the available literature and agrees with Courtney et al. (2004) that spotted owl home range values reported in more recent studies are similar to home range values presented in Thomas et al. (1990).

The available science (Bart and Forsman 1992, Bart 1995, Forsman et al. 2006) suggests that as the amount of suitable habitat in an owl's home range decreases, so does site occupancy, reproduction, and survival. Bart and Forsman (1992) found that areas with less than 20 percent suitable habitat had few owls and less reproductive success than areas with more suitable habitat. In 1995, Bart re-analyzed his prior data, and concluded that spotted owl reproduction and survival decreased as suitable habitat decreased from 40 to 20 percent. While the threshold amounts of habitat needed to support spotted owls is uncertain, the studies cited above suggest that the removal of suitable habitat to below 40 percent of the median annual home range area is likely to cause significant impairment of spotted owl life history functions. Based on these studies, suitable habitat coverage of at least 40 percent or higher at the home range scale is likely necessary for maintaining spotted owl life history functions, although site-specific conditions may warrant deviations from this guideline. Similar to the core area, we suggest the lower value, in this case 40 percent, because this is where an effect of significant impairment of spotted owl life history functions, is most likely to occur. Light-to-moderate thinning types of activities that

maintain the extent and function of NRF habitat within a home range are generally not likely to have adverse effects to spotted owls.

In summary, NRF habitat removed to an extent that lowers the amount of suitable habitat cover within a home range to below 40 percent within a spotted owl home range area will likely have adverse effects to and may cause take of the spotted owl. However, the site and action-specific situations may warrant exceptions to this general guidance at any of the spatial scales discussed herein. The BA should include a clear and complete discussion of the justification for any exception. We recognize that in some portions of the spotted owl's range many known occupied owl sites are already below these thresholds. In these situations, a determination of take in the form of harm or harassment can occur multiple times at the same site to the same pair of spotted owls as long as the species is believed to still be present.

Rationale for Effect Determinations

The following guidance is intended to assist BLM and FS staff and managers in making project-related effect determinations as well as minimizing project effects to spotted owls. It should also be used as the basis for incidental take findings in FWS BiOps. Administrative Unit Staff and Level 1 Teams are encouraged to follow this guidance when assessing effects in their BAs, where no or only partial spotted owl survey information is available for the analysis area. If you have current survey information, use it when assessing the effects of a proposed action on the spotted owl.

Under this methodology, any removal of spotted owl habitat is presumed likely to have adverse effects to the spotted owl within identified spotted owl home ranges. However, the location of the habitat removal in relation to spotted owl sites must be evaluated for the FWS to determine if "incidental take" may occur. In some cases, site and action-specific situations may warrant a NLAA determination. As previously mentioned, a reasoned explanation should accompany any NLAA determination, particularly if habitat removal will occur

In general, the following list of scenarios (Table 4), which is not comprehensive, may occur in conjunction with a proposed project; the rationale supporting the habitat values are discussed below. The information provided in Table 4 is intended to help action agencies "forecast" the results of their actions so they can make feasible project adjustments to help reduce the likelihood of the projected take occurring.

Table 4. Potential habitat condition scenarios and their associated effect on the spotted owl. Site and action-specific situations may justify a different effect determination than presented below.

Habitat Condition Pre-Treatment	Habitat Condition Post-Treatment due to Habitat Removal or Downgrading	Effect	Take
Nest Patch: 300-meter radius contains any condition.	Nest Patch: 300-meter radius contains any condition that was subject to commercial thinning of NRF or Dispersal-only habitat.	LAA[1]	Yes

In the following scenarios, presume no actions will be occurring at the nest patch scale and that NRF habitat is removed or downgraded to dispersal habitat; the scenarios below exclude light-thinning that maintains habitat function.			
Core area contains > 50% NRF habitat and home range contains >40% NRF habitat	Core area contains >50% NRF habitat and home range contains >40% NRF habitat	LAA	No
	Core area contains >50% NRF habitat and home range contains <40% NRF habitat	LAA	Likely
	Core area contains <50% NRF habitat and home range contain >40% NRF habitat	LAA	Likely
	Core area contains <50% NRF habitat and home range contains <40% NRF habitat	LAA	Likely
Core area contains >50% NRF habitat and home range contains <40% NRF habitat	Core area contains >50% NRF habitat and home range contains <40% NRF habitat	LAA	Likely
	Core area contains <50% NRF habitat and home range contains <40% NRF habitat	LAA	Likely
Core area contains <50% NRF habitat and home range contains >40% NRF habitat	Core area contains <50% NRF habitat and home range contains >40% NRF habitat	LAA	Likely
	Core area contains <50% NRF habitat and home range contains <40% NRF habitat	LAA	Likely
Core area contains <50% NRF habitat and home range contains <40% NRF	Core area contains <50% NRF habitat and home range contains <40% NRF habitat	LAA	Likely

[1]See Nest Patch discussion on pages 13-14 above for the rationale supporting this determination.

In analyzing effects of actions to spotted owls, habitat amount and spatial distribution are important. For BiOps, an incidental take statement would be provided where the consultation biologist believes LAA determinations rise to the level of incidental take, with the habitat juxtaposition being a primary factor in this determination.

A reminder: the ITS methodology only quantifies potential occupancy/density of spotted owls for a given area. In reality, projects are being planned and implemented in unsurveyed suitable habitat. If a project is removing NRF habitat, there is a possibility that the project is removing an occupied nest tree, therefore, appropriate seasonal restrictions should be applied accordingly unless incidental take is authorized.

Step 6: Use the Information from Step 5 to Develop the Effects of the Action and ITS Portions of the Biological Opinion.

Habitat and disturbance-related take (i.e., harm and harass, respectively) should be quantified in terms of number of spotted owls. Sum the number of impacted home range circles within the action area where the effect determination is LAA and take is likely, and multiply by 2 (to account for up to 2 adult owls in each circle). The number of spotted owl young (average1.5/nest) likely to be affected/taken will have to be accounted for during the breeding season for inclusion in the BiOp/ITS. The total take would be calculated based on multiplying

the number of "take" circles with 2 adults and 1.5 young, then round up for a whole number of spotted owls. If the activity occurs outside the critical breeding season then there would be no take of young. Monitoring forms (see discussion below) should summarize the total number of owls taken.

How much take has occurred? For spotted owls, the effect of take of adults is more likely to be in the form of disruption of normal behavior patterns and would not to necessarily lead to death or bodily injury. This disruption could result in reduced fitness of the owls (e.g., movement, reduced reproduction or survival, or decreased ability for the young to survive fledging or dispersal) because of poorer habitat conditions. In these situations, a determination of take in the form of harm or harassment could occur multiple times at the same site to the same pair of spotted owls. For example, a nest patch considered to be occupied by one pair of spotted owls is maintained in year one, is disturbed due to noise caused by project A in year 2, and is subject to habitat removal by project B in year 3. In this example, one pair of owls may be considered taken by the proposed action in the form of harassment (year 2) and harm (year 3). In this scenario, take is recorded when the Level 1 Team has determined "implementation" to occur. For the purposes of this process, Level 1 Teams should reaffirm their implementation definition. This method of recording is used so as to not double count take of an owl pair under a single consulted-on action.

It is imperative that prior to signing of a BiOp, the FWS and the Level 1 Team and/or Administrative Unit discuss and agree upon the take units of measure and specifically the amount of allowable take to ensure the same understanding by both parties. Having this common understanding should help to avoid confusion later on during monitoring, and in tracking the amount of take that has occurred.

.

For an assessment of effects to spotted owl dispersal habitat, continue to use a process that you and/or your Level 1 Team determine is appropriate. Preferably, this effects analysis is done at a landscape scale of at least a 5th field watershed and considers the conditions that are needed to help ensure adequate spotted owl survival during dispersal.

B. Reporting/Monitoring the Amount of Incidental Take

All projects scheduled for implementation as described in a BiOp will use a process similar to that described under Section A above to quantify (in advance of implementing the projects) and report the amount of incidental take on a project-by-project basis to ensure that the incidental take limit set forth in the ITS portion of the BiOp is not exceeded. At this stage, you will use the final design of treatment unit boundaries and any refinements of the activity to confirm the likely impacts to spotted owls and their habitat prior to project implementation. The following discussion is a summary of the steps that should be completed to confirm and report those impacts (see the steps outlined above in Section A for greater details).

Step 1: Map the geographic location of final action/units and overlay the spotted owl provincial home range diameter around each unit to define the analysis area.

Step 2: Overlay the Administrative Unit-updated spotted owl habitat layer on your analysis area.

Step 3: Reaffirm the position of known and predicted spotted owl site centers.

Step 4: Determine the number of spotted owl sites that are likely to be affected by the final actions/units by delineating nest patch areas, core areas and home ranges around each site center using the appropriate provincial values (Table 2).

Step 5: Quantify the amount of take in terms of spotted owls by applying the thresholds discussed above under Section A, Step 5.

Step 6: Compare the anticipated take for the project to any previously authorized take under the ITS of the BiOp. The action agency has the primary responsibility to track the cumulative level of take for implemented projects to ensure it does not exceed the amount of take exempted in the ITS. The FWS can also verify the cumulative level of take based on the monitoring reports received to date.

Step 7: Reinitiation of consultation will be necessary if the take level (habitat acres or numbers of owls) exempted in the ITS of the BiOp is reached and there are still projects covered under the BiOp to be implemented that are likely to cause take.

C. Monitoring Reports

It is the responsibility of the action agencies to submit monitoring reports to the FWS as stipulated (annually or otherwise) in the monitoring requirements section of an ITS. Both the number of affected acres and associated spotted owls shall be recorded on a standardized form; these data will subsequently be entered into the FWS Northern Spotted Owl Effects Tracking Database by the FWS. The Administrative Units are responsible for monitoring take exempted in BiOps and reinitiating consultation if the amount of exempted take is likely to be exceeded. Reinitiation must occur before the take limit is exceeded. Level 1 Teams have the primary responsibility for monitoring the amount of incidental take relative to the limit established in specific ITSs.

Appendix 1. This appendix provides the methodology for developing a northern spotted owl occupancy map (NSOOM) for areas lacking current survey information.

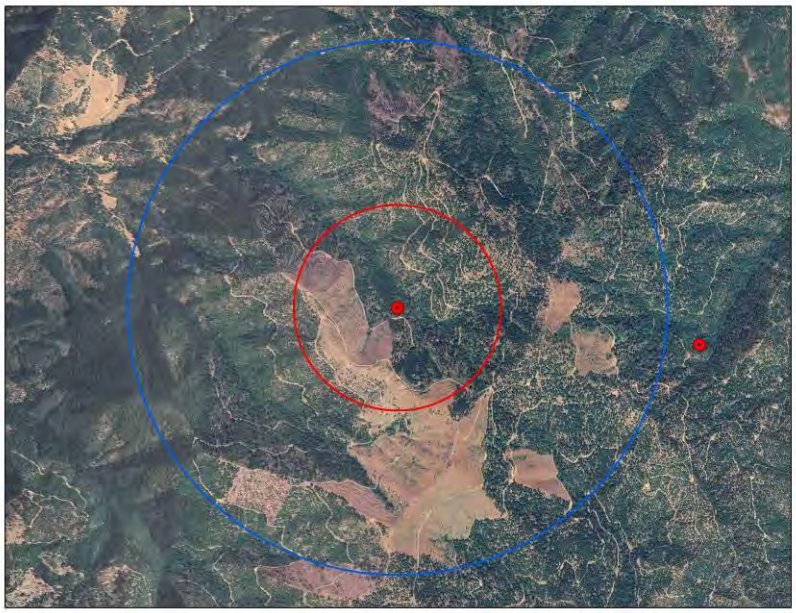
The information provided on the following pages describes the process and technical information used in the development of a NSOOM. Future and revised NSOOMs will continued to be developed by the ITS Team in collaboration with Level 1 Teams.

To supplement an Administrative Unit's use of historic owl locations, the authors of the "Methodology for Estimating the number of Northern Spotted Owls affected by Proposed Federal Actions" initiated a data call to collect current spotted owl occupancy location information for spotted owl demographic study areas on a provincial basis in order to conduct a habitat assessment around the sites using various spatial scales. In return, this information was used to guide placement of computer-generated spotted owl sites. In addition, the same data were used to calculate a density and nearest neighbor distance, both of which help determine "placement" of computer-projected owl sites. In situations where there was no demographic area to rely upon (e.g., Oregon Cascades – Roseburg BLM), a stratified sample of known spotted owl sites with recent occupancy information, based on administrative surveys, was used to conduct the habitat analysis.

The following spatial scales and GIS queries were used to conduct the habitat analysis and to develop placement of computer-projected spotted owl location points on a NSOOM. These spatial scales (Figure 3) are supported in the spotted owl literature for reflecting landscape-level characteristics of sites occupied by spotted owls (Thomas et al. 1990, Swindle et al. 1999, Perkins et al 2000, Ripple et al. 1991 and 1997, Courtney et al. 2004).

- Patch size acreage that nest trees are typically associated with
- Core area size and habitat amount
- Home range area size and habitat amount
- Habitat = smoothed habitat suitability values (Davis and Lint *in* Lint 2005, GTR-648)
- Nearest-neighbor distance and density

Figure 3. The spatial scales used in the development of a spotted owl occupancy map. The outer circle represents the median provincial home range, the inner circle approximates a core area, and the center point represents the nest tree within a nest patch. The dot outside, to the right of the home range circle, represents a second spotted owl site that could be a nearest neighbor distance away.



The following sections discuss the spatial analyses in greater detail. A document is being prepared that provides more specific step-by-step instructions on the GIS procedures.

A 300-meter radius area (encompassing approximately 75 acres) around the nest site is the spatial scale important to spotted owls; and having as much of this area contained in suitable habitat is key to nest position on the landscape. As stated earlier in this document, the 300 meter radius will be the value used to assess effects determinations and the development of future NSOOMs. Previous NSOOMs used a 200-m radius scale and quantified habitat acreage within this radius of demographic study owl sites. However, further investigation of the research also suggested a 300 meter radius, which is complimented by other spotted owl ecological information (see pages 13-14 above). A 90 percent rule was established for selecting the percent suitable habitat value within the nest patch to use for placing a computer-projected owl site on a map. The 90 percent rule basically uses the percent suitable habitat value associated with 90 percent of the owl sites in the dataset and establishes the lower habitat value based on the owl site that occurs at the 90 percent break. In this approach, most of the variability within the patch scale data was retained in the analysis. The patch size habitat values for the various provinces are shown in Table 5. Again, these values were derived from the 90 percent rule and 200-meter patch size for the earlier September 2007 document. The habitat base layer used for the spotted owl site habitat analysis was the Biomapper product, utilizing the smoothed habitat suitability index layer (Table 4) (Davis and Lint *in* Lint GTR-648).

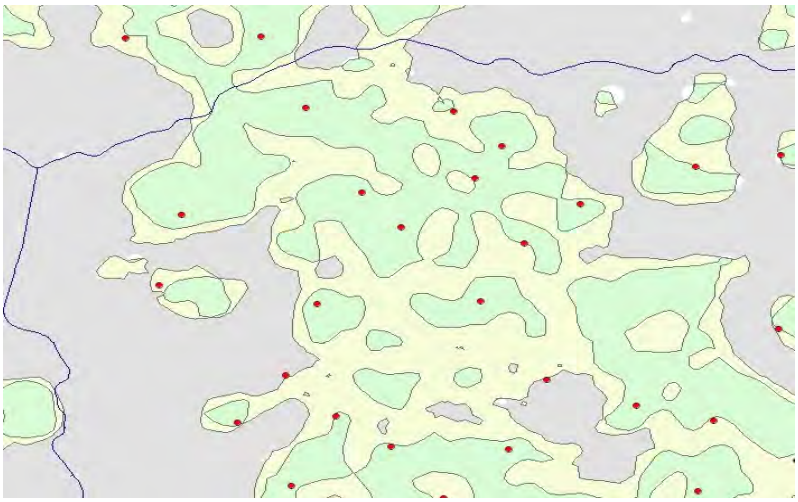
An example of the patch size analysis is depicted in **Figure 4** below. The darker green area represents spotted owl suitable habitat, the lighter, larger polygon areas represent the result of the 200-meter radius (patch size) circular neighborhood analysis, and the dots represent known spotted owl sites. The gray area represents non-spotted owl habitat.

Core Area Analysis

We relied on a 0.5-mile (800-m) radius (an area encompassing about 500 acres) spatial scale to approximate a spotted owl core area for the Cascades (East and West), Coast and Klamath Provinces in Oregon. The 500-acre value was derived from spotted owl telemetry studies and landscape occupancy models (Olson et al. 2005, Dugger et al. 2005, Zabel et al. 2003, Swindle et al. 1999, Meyer et al. 1998, Wagner and Anthony 1998, Glenn et al. 2005, and Carey et al. 1992). To date, Oregon has been the focus of the analysis. Core area values for Washington are available and will be used when the need arises to develop NSOOMs for provinces in Washington (Table 2).

To calculate habitat amount for the core area, we again utilized spotted owl sites from the demography study areas and the Biomapper provincial values (Table 5). Similar to the nest patch analysis, a lower habitat value representing the percent cover of suitable habitat within the core area was computed based on the 90 percent rule and was used in the GIS neighborhood analysis (Table 5). The overall habitat amount ranged from just under 100 acres to over 400 acres at the core scale. At this point in the analysis, nest patch and core area habitat values have been calculated. The results of both circular neighborhood analysis (nest patch and core area spatial scales) were then spatially intersected across the landscape.

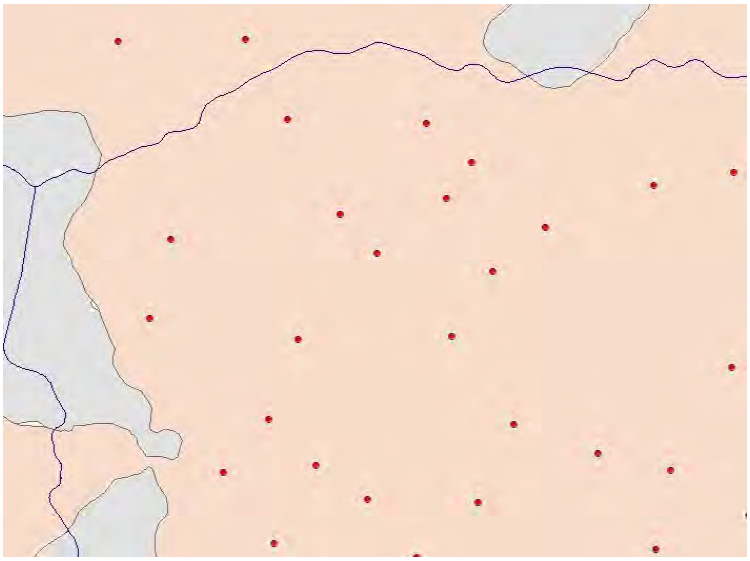
Figure 5 is an example landscape showing known spotted owl locations (dots), results of the 200-m nest patch scale analysis (the dark green-shaded polygons as depicted in Figure 4 above) and results of the core area radius analysis (the lighter green areas). The dark green-shaded polygons also represent the intersection of the two spatial analyses. The gray area represents portions of the landscape with too little spotted owl habitat to meet either 200-meter or 0.5-mile 90 percent criteria.



Home Range

The final spatial scale used to generate computer-projected spotted owl sites was the home range. Median provincial home range values (Table 2) were used to compute habitat amounts at spotted owl demography sites. The same habitat layer was used as for the nest patch and core area analyses, and the 90 percent home range scale values are presented in Table 5. Again, these habitat values were used to construct the neighborhood analysis at the home range scale, which involved the spatial intersection of home range, core area and nest patch analysis results on the landscape.

Figure 6 shows an example result of the home range-scale circular neighborhood analysis. Known spotted owl locations are shown as dots.



The results of the three analytical scales were then spatially intersected to identify portions of the landscape meeting the 90 percent threshold criteria at all three spatial scales (Figure 7, cross-hatched area). Any suitable habitat therein is considered likely occupied. Thus intersecting the spatial analyses results with a map of suitable habitat (in this example, the Biomapper HSI grids) results in a map of habitat likely occupied by spotted owls (Figure 8; dark green area).

Figure 7.

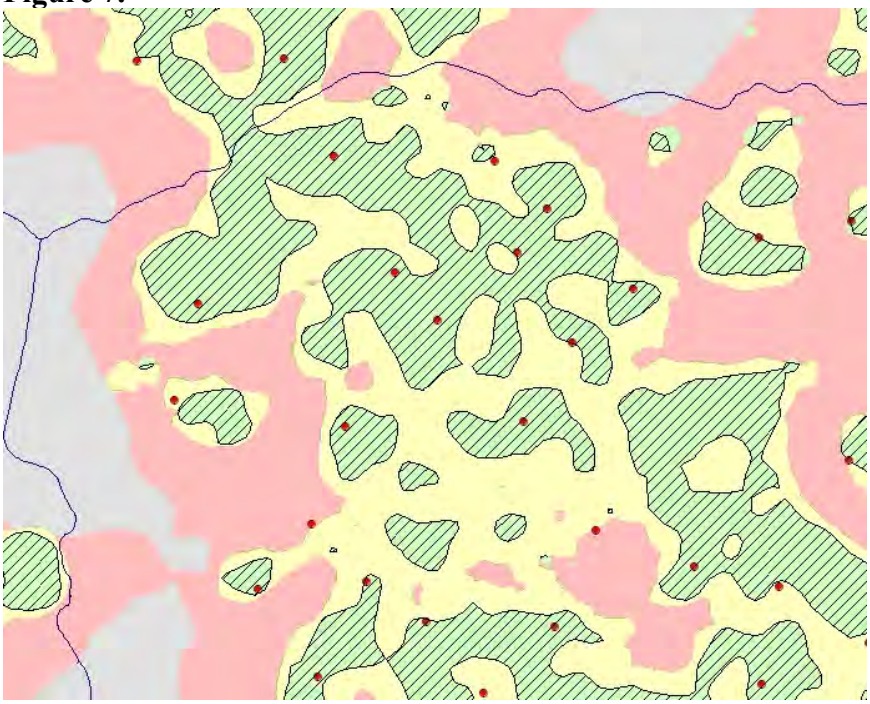


Figure 8.

Positioning of Computer-Projected Owl Sites

The above spatial analyses result in a map of habitat likely occupied by spotted owls. The next question then becomes, where, more specifically are spotted owls likely to occur within the habitat? We utilized nearest-neighbor distances (NND) between spotted owl sites derived from demography study areas to help position a computer-generated spotted owl site on the map. The NND was used to position generated sites among already known owl sites that were provided by the Administrative Units. A GIS function random point generator was calibrated with the NND (Table 5) and the density of owls on demographic study areas to help place generated sites on the map. These generated sites were also constrained to occur within likely occupied habitat.

Figure 9 shows an example of a NSOOM that has both historic sites (green dots) provided by an Administrative Unit along with computer-generated points (red dots) based on habitat spatial analyses, NND, and density values.

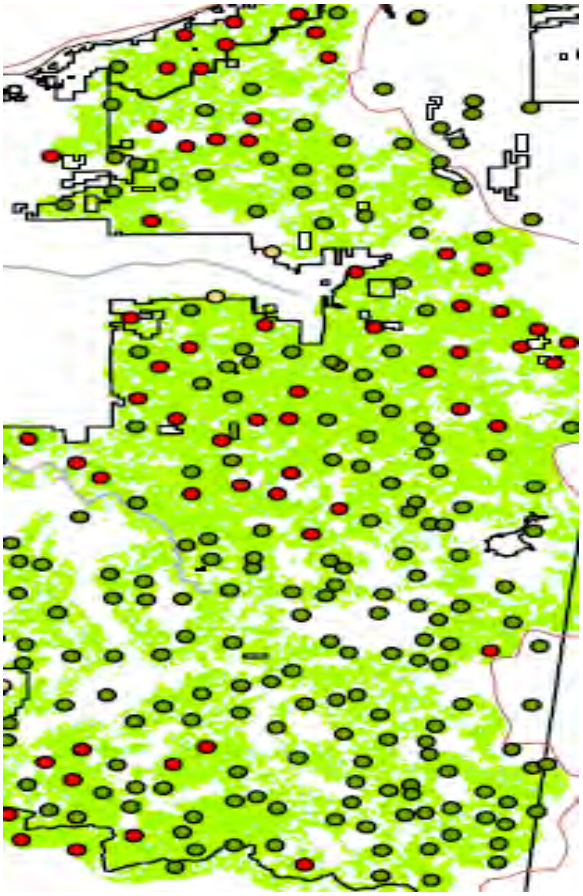


Table 5. Provincial habitat values based on the 90 percent rule (expressed in % of nest patch, core area, and home range covered by suitable habitat) used in a GIS neighborhood analysis for developing a map of likely occupied spotted owl habitat. The percentages represent the lowest value for 90% of the site analyzed. Note: These values are not used for assessing incidental take; those values are presented elsewhere in this document.

Admin Unit	Willamette NF	Mt. Hood NF	Roseburg BLM			Medford BLM		Eugene BLM	
Province	Cascades	Cascades West / East[2]	Coast	Cascades[2]	Klamath	Cascades	Klamath	Coast	Cascades
Habitat Suitability[1]	56	56/50	52	56	51	56	51	52	56
Patch (200m) habitat	40%	40%/44%	47%	45%	44%	33%	41%	42%	26%
Core (800m) habitat	35%	35%/42%	37%	35%	33%	23%	38%	31%	19%
Home Range habitat	35% (1.2 mi)	35%/36% (1.2 mi)	30% (1.5 mi)	33% (1.2 mi)	30% (1.3mi)	18% (1.2 mi)	31% (1.3 mi)	28% (1.5mi)	17% (1.2mi)
Nearest Neighbor	2080m	2080m/2374m	2084m	2333m	2078m	2333m	2596m	2478m	2611m
Density	H.J.A. study area	H.J.A. study area/GIS created	Tyee study area	GIS created	GIS created	Butte Falls study area	Evans Creek study area	Siuslaw NF	NCASI &GIS

Admin Unit	Siulsaw NF	Fremont-Winema NF	Coos Bay BLM (combined Klamath & Coast)	Rogue-Siskiyou NF	
Province	Coast	East Cascades	Coast/KLA	Cascades	Klamath
Habitat Suitability[1]	52	50	52/51	56	51
Patch (200m) habitat	40%	44%	52%	38%	41
Core (800m) habitat	31%	26%	47%	37%	38
Home Range	32% (1.5mi)	25% (1.2 mi)	30% (1.3&1.5 mi)	28%(1.2mi)	31(1.3mi)

habitat					
Nearest Neighbor	2478m	2446m	2084m	2446m	2596m
Density	Siuslaw NF	SO. Cascades demog. area	Tyee study area	SO. Cascades demog. area	SO. Cascades demog. area

[1] Habitat: The smoothed habitat suitability layer provided by Davis and Lint, GTR 648, Appendix G.

[2] Mt Hood East Cascades and Roseburg BLM Cascades habitat values, nearest-neighbor distances, and density were computed from a sample of occupied spotted owl sites for those Administrative Units during the same period as a habitat layer was available (i.e., the 1994 Biomapper map).

Validation of NSOOM Methodology

The ITS Team utilized a number of methods to help validate the process/methodology of quantifying an estimate of the number of spotted owls in a given area.

The first method used was to consider the actual survey information demonstrating spotted owl occupancy in a given area. As much as possible, spotted owl sites mapped by Administrative Units were used to serve as a foundation for the NSOOM.

The second method used was application of the "90 percent rule" developed by the ITS Team. For this methodology, 90 percent of known and recently occupied spotted owl sites were used to develop habitat relationships at three spatial scales (nest patch, core, and home range) for a given area. In using 90 percent of the sites, we captured a wide variation in the extant habitat conditions that the owls are residing in. What wasn't captured was the lower 10 percent of sites in very marginal habitat conditions. This resulted in only a few sites not being used in most of the areas for which the methodology was applied. The 90 percent methodology has some previous use in helping to define habitat conditions per Lint 2005, GTR 648.

The third way of evaluating the methodology was a direct comparison to a spotted owl density study area. Surveys on the density area were comprehensive with the intent of surveying most or all habitat conditions in an attempt to find all resident spotted owls. Using these known owl sites, we assessed the habitat conditions for the three spatial scales around the sites. After completing the habitat analysis, along with a nearest-neighbor analysis and knowing the range of densities on this area, we calibrated the GIS random generation function to place spotted owl sites across the area. For the few simulations completed, approximately the same number of computer-generated sites occurred as the number of known owl sites and in some simulations, more sites occurred. Having this similarity of concurrence or even more sites, helps affirm the validity of the methodology, in terms of estimating, conservatively, the number of spotted owl sites in a given area.

Lastly, the methodology was validated based on review by spotted owl field biologists, who would be familiar with the practicalities of the application of the methodology, and researchers' familiar with the latest information on spotted owl-habitat associations. We visited with the biologists and incorporated their comments into this product. In addition, we consulted with 2 leading spotted owl scientists; both believed that the methodology was appropriate for use in assessing effects of actions on spotted owls for purposes of estimating the amount of incidental take.

Glossary

attribute: information about a geographic feature in a geographic information system, usually stored in a table.

central-place animal: resource use by spotted owls where the spatial pattern of habitat limits use; use decreases with increasing distance from a nest tree.

core area: the area that provides important habitat elements for nest sites, roost sites, and access to prey, benefiting spotted owl survival and reproduction. Spotted owls typically use 20-21 percent of their home range as core area habitat, which generally includes 60-70 percent of the sites within their home range used during the breeding season.

demography: the quantitative analysis of population structure and trends; population dynamics.

density: the number of spotted owls or spotted owl sites per a unit of area.

dispersal: the movement, usually one way and on any time scale, of plants or animals from their point of origin to another location where they subsequently produce offspring.

dispersal habitat: forest stands with average tree diameters > 11 inches, conifer overstory trees with closed canopies (> 40 percent canopy closure), and open space beneath the canopy that allows owls to fly (Thomas et al. 1990).

edge: where plant communities meet or where successional stages or vegetative conditions with plant communities come together.

edge-matching: the process conducted by Level 1 teams or their representatives where historic owl sites or computer points along mutual border areas of administrative units or provinces are checked for: 1) location accuracy, 2) to eliminate duplicate sites or points, and 3) to affirm nearest-neighbor distances. This process is typically conducted at the time of NSOOM generation or as new information is reveal (i.e., addition of new sites).

fecundity: a measure of animal (in this case, spotted owl) productivity expressed as the number of female young per adult female.

geographic information system (GIS): a computer system capable of storing, manipulating, and displaying spatial (that is, mapped) data.

guideline: a policy statement that is not a mandatory requirement (as opposed to a standard, which is mandatory).

habitat: the resources and conditions present in an area that produce occupancy – including survival and reproduction – by a given organism.

habitat maintained: habitat that is altered but still maintains its function post-alteration.

habitat removal: the harvest of trees comprising suitable spotted owl habitat where the stand of trees no longer performs its prior function.

home range: the area annually traversed by spotted owls that provide important habitat elements.

landscape: a heterogeneous land area with interacting ecosystems that are repeated in similar form throughout the area.

nearest-neighbor: the overall average distance as measured among known spotted owl sites; utilized in determining spatial patterns of spotted owl sites.

neighborhood functions: geographic information systems analytical functions (such as mean, maximum, or a variety of values) that assign a value to each grid cell by taking its surrounding pixels into consideration.

northern spotted owl: one (*Strix occidentalis caruina*) of three subspecies of spotted owl that ranges from southern British Columbia, Canada, through western Washington and Oregon, and into northwestern California. Listed as a threatened species by the U.S. Fish and Wildlife Service.

northern spotted owl occupancy map (NSOOM): a spatially explicit map developed by utilizing known spotted owl locations and computer-generated locations that serve as spotted owl sites based on the density, nearest-neighbor distance and habitat spatial arrangement.

physiographic province: a geographic area having a similar set of biophysical characteristics and processes because of the effects of climate and geology that result in patterns of soils and broad-scale plant communities. Habitat patterns, wildlife distributions, and historical land use patterns may differ significantly from adjacent provinces.

polygon: a graphic feature that represents an area in a geographic information system.

range (of a species): the area or region over which an organism occurs.

stand (tree stand): an aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.

stochastic: random, uncertain; involving a random variable.

suitable habitat: an area having the resources and conditions present to produce occupancy – including survival and reproduction – for the spotted owl.

take: Defined under section 3(19) of the Endangered Species Act as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct".

"Harm" is further defined in the regulations as an act that causes significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. "Harass" is further defined in the regulations as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering.

wildfire: any wildland fire that is not a prescribed fire.

windthrow: synonymous with windfall, blow down.

Literature Cited

Anthony, R.G. et al. multiple years. Unpublished. Annual reports from northern spotted owl demography study areas. On file at the USFWS Oregon State Office, Portland, OR.

Wagner, F.F. and R.G. Anthony. 1998. Reanalysis of northern spotted owl habitat use on the Miller Mountain study area. A report for the Research Project: Identification and evaluation of northern spotted owl habitat in managed forests of southwest Oregon and the development of silvicultural systems for managing such habitat. Oregon Cooperative Wildlife Research Unit, Depar.Fisheries and Wildlife, Oregon State Univ. Corvallis, OR.

Bart, J. and E.D. Forsman. 1990. Surveys of Northern Spotted Owls on Public Lands. Ohio Cooperative Research Unit, Department of Zoology. Ohio State University, Columbus, OH. Also USDA For. Serv., Forestry Sciences Laboratory, Olympia, WA.

Bart, J. and E.D. Forsman. 1992. Dependence of Northern Spotted Owls, *Strix occidentalis caurina*, on Old-Growth Forests in the Western United States. Biological Conservation 62(2):95-100.

Bart, J. 1995. Amount of Suitable Habitat and Viability of Northern Spotted Owls. Conservation Biology 9(4):943-946.

Bingham, B. and B.R. Noon. 1997. Mitigation of Habitat Take: Application to Habitat Conservation Planning. Conservation Biology 11(1):127-139.

Bingham, B. and B.R. Noon. 1998. The Use of Core Areas in Comprehensive Mitigation Strategies. Conservation Biology 12(1):241-243.

Carey, A.B., S.P. Horton, and B.L. Biswell. 1992. Northern spotted owls: influence of prey base and landscape character. Ecological Monographs 62(2):223-250

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutiérrez, J.M. Marzluff, L. Sztukowski. 2004. Scientific evaluation of the status of the northern spotted owl. Sustainable Ecosystems Institute. Portland, Oregon. September 2004.

Crozier, M.L., M.E. Seamans, R.J. Gutierrez, P.J. Loschl, R.B. Horn, S.G. Sovern, and E.D. Forsman. 2006. Does the presence of barred owls suppress the calling behavior of spotted owls? Condor 108:760-769.

Dugger, K. M., F. Wagner, R. G. Anthony, and G. S. Olson. 2005. The relationship between habitat characteristics and demographic performance of northern spotted owls in southern Oregon. The Condor. 107:863-878.

Forsman, E.D. et al. multiple years. Unpublished. Annual reports from northern spotted owl demography study areas. On file at the USFWS Oregon State Office.

Forsman, E.D., T.J. Kaminiski, J.C. Lewis, K.J. Maurice, and S.G. Sovern. 2005. Home range and habitat use of northern spotted owls on the Olympic Peninsula, Washington. J. Raptor Research 39(4):365-377.

Franklin, A.B., D.R. Anderson, R.J. Gutiérrez, and K.P. Burnham. 2000. Climate, habitat quality, and fitness in northern spotted owl populations in northwestern California. Ecological Monographs 70(4):539-590.

Glenn, E.M., M.C. Hansen, R.G. Anthony. 2004. Spotted Owl Home-Range and Habitat Use in Young Forests of Western Oregon. J. Wildl. Man. 68(1):33-50.

Irwin, L. L., D. F. Rock, and G. P. Miller. 2000. Stand structures used by northern

spotted owls in managed forests. Journal of Raptor Research. 34(3):175-186.

Irwin, L. L., D. Rock, and S. Rock. 2005. Adaptive management monitoring of spotted owls. Annual National Council for Air and Stream Improvement progress report. Unpubl.

Lint, J., technical coordinator. 2005. Northwest Forest Plan – the first 10 years (1994-2003): status and trends of northern spotted owl populations and habitat. PNW-GTR-648, USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon.

Meiman, S., R.G. Anthony, E. Glenn, T. Bayless, A. Ellingson, M.C. Hansen, and C. Smith. 2003. Effects of commercial thinning on home range and habitat-use patterns of a male northern spotted owl: a case study. Wildl. Soc. Bull. 31(4)1254-1262.

Meyer, J.S., L.L. Irwin, and M.S. Boyce. 1998. Influence of habitat abundance and fragmentation on northern spotted owls in western Oregon. Wildlife Monog. No. 139.

Miller, G.S. 1989. Dispersal of juvenile spotted owls in western Oregon. M.S. Thesis. Oregon State University, Corvallis, Oregon.

Miller, G.P., D.F. Rock, and L.L. Irwin. 1992. Spotted owl occupancy and habitat use in intermediate-aged forests western Oregon - 1991 progress report. U.S. Department of the Interior, Bureau of Land Management, Springfield, OR.

Olson, G.S., E. Glenn, R.G. Anthony, E.D. Forsman, J.A. Reid, P.J. Loschl, and W.J. Ripple. 2004. Modeling demographic performance of northern spotted owls relative to forest habitat in Oregon. J. Wildlife Management 68(4):1039-1053.

Olson, G.S., R.G. Anthony, E.D. Forsman, S. Ackers, P.J. Loschl, J.A. Reid, K. Dugger, E. Glenn, W.J. Ripple. 2005 Modeling site occupancy dynamics for northern spotted owls, with emphasis on the effects of barred owls. J. Wildl. Manage 69(3):918-932.

Pearson, B. 2007. Commercial thinning and spotted owls. Unpubl. Report.

Perkins, J.P. 2000. Land cover at northern spotted owl nest and non-nest sites, east-central coast ranges, Oregon. M.S. thesis. Department of Forest Resources, Oregon State University, Corvallis, OR.

Ripple, W. J., D. H. Johnson, K. T. Hershey, and E. C. Meslow. 1991. Old-growth and mature forests near spotted owl nests in western Oregon. Journal of Wildlife Management. 55(2):316-318.

Ripple, W.J., P.D. Lattin, K.T. Hershey, F.F. Wagner, and E.C. Meslow. 1997. Landscape composition and pattern around northern spotted owl nest sites in southwest Oregon. J. Wildlife Management 61(1):151-158.

Roseburg District BLM 2008. Biological Assessment for the proposed activities affecting the northern spotted owl.

Rosenberg, D.K. and K.S. McKelvey. 1999. Estimation of habitat selection for central-place foraging animals. J. Wildlife Management 63(3):1028-1038.

Seattle Audubon et al. v Doug Sutherland et al. 2007. Court opinion enjoining Weyerhaeuser Company from logging spotted owl habitat on private lands. U.S. District Court Western Washington District Court of Seattle.

Swindle, K.A., W.J. Ripple, E.C. Meslow, and D.J. Schafer. 1997. Old-forest distribution around spotted owl nests in the central Cascade Mountains, Oregon. M.s. Thesis, Oregon State University.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. A conservation strategy for the northern spotted owl. A report by the Interagency Scientific

Committee to address the conservation of the northern spotted owl. USDA, Forest Service, and U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service. Portland, OR.

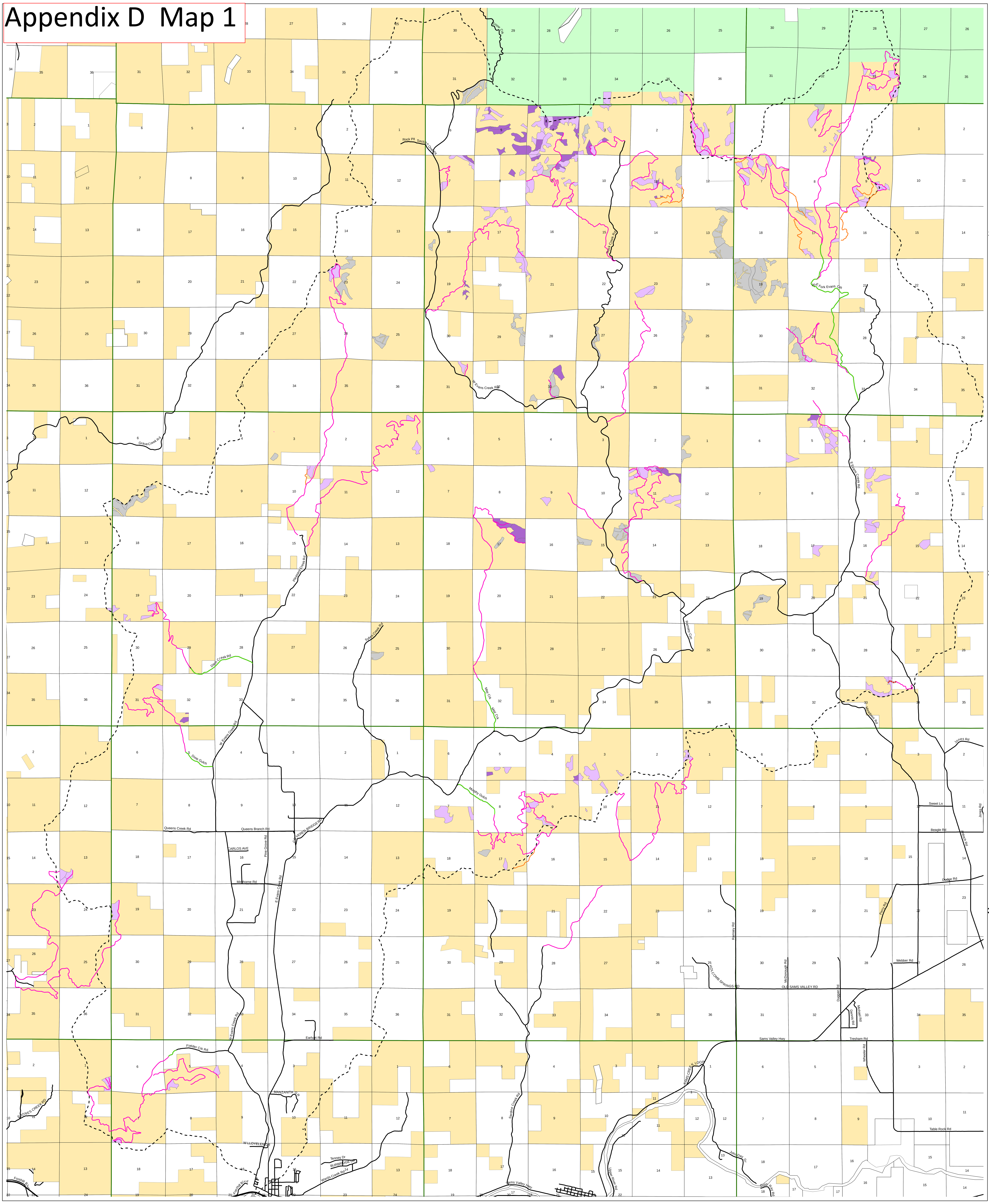
Thomas, J.W., and M.G. Raphael (Eds.) 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Report of the Forest Ecosystem Management Assessment Team (FEMAT). July 1993. Portland, OR: USDA Forest Service and the USDI Bureau of Land Management.

U.S. Fish and Wildlife Service. 1990. Procedures leading to the assessment of incidental take of spotted owls. Rescinded guidelines 1990. USFWS, Portland, OR.

U.S. Fish and Wildlife Service. 2007. Draft Recovery Plan for the Northern Spotted Owl. Merged Options 1 and 2. Portland, Oregon. 170 pp.

Zabel, C.J., J.R. Dunk, H.B. Stauffer, L.M. Roberts, B.S. Mulder, and A. Wright. 2003. Northern spotted owl habitat models for research and management application in California. Ecological Applications 13(4):1027-1040.

Appendix D Map 1



Road Projects

TREAT_ALT3

- **New Const-Permanent**
- **Renovate**
- **Major Renovate**
- **Brushing**

Paved Road

Evans Creek TS Units

Treat_alt3

- Dry Forest Restoration 40%
- Dry Forest Restoration 60%

Stewardship Units

Watershed Boundary

Private

Forest Service

BLM-Administered

N W E S

MAP SCALE = 1 : 12,000

Jan 25, 2011

P:...\Projects\Timber\Timber Sales\Evans Creek\2010 EA Analysis\Maps\EvansCreek_Alt3.mxd

Appendix D Map 2

R4W

R3W

R2W

T 33 S

T 34 S

T 35 S

UPPER COW CREEK

TRAIL CREEK

EVANS CREEK

Huc 5 Watersheds

Evans Creek TS Units

Treat_alt3

Dry Forest Restoration 40%

Dry Forest Restoration 60%

Stewardship Units

Private

Forest Service

BLM-Administered

N

W E

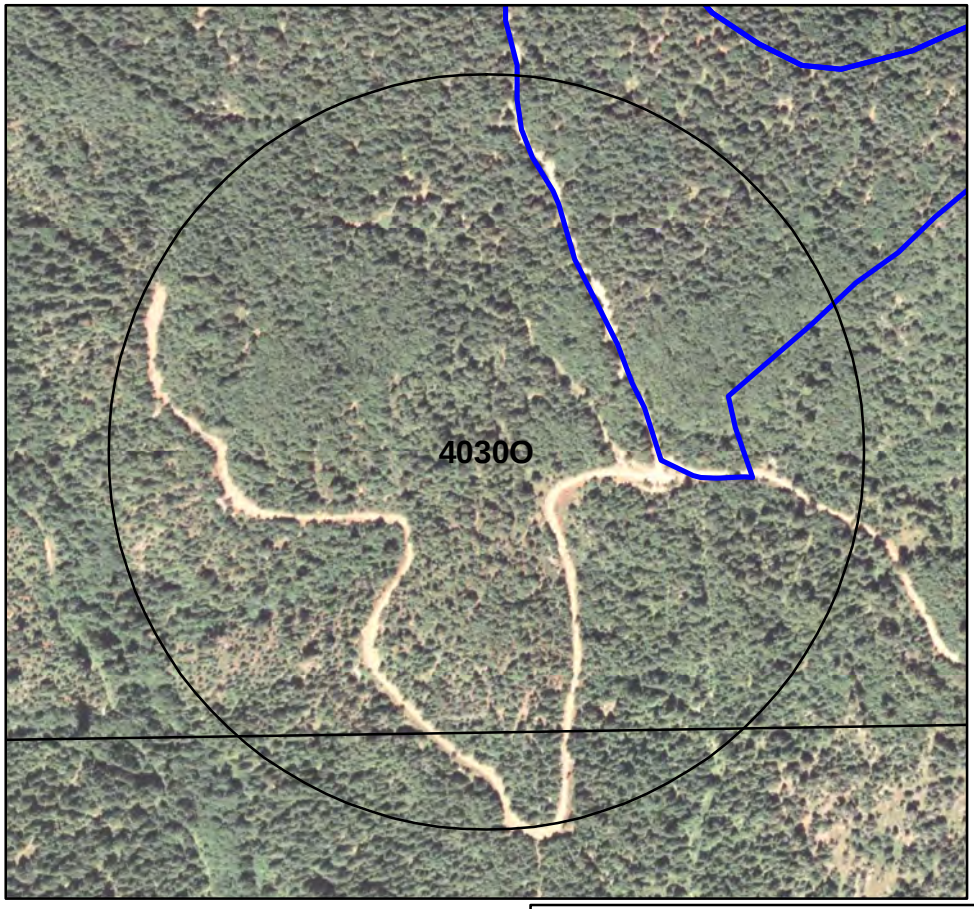
S

MAP SCALE = 1 : 12,000

Jan 25, 2011

P:...\Projects\Timber\Timber Sales\Evans Creek\2010 EA Analysis\Maps\EvansCreek_Alt3.mxd

Appendix E Map 1

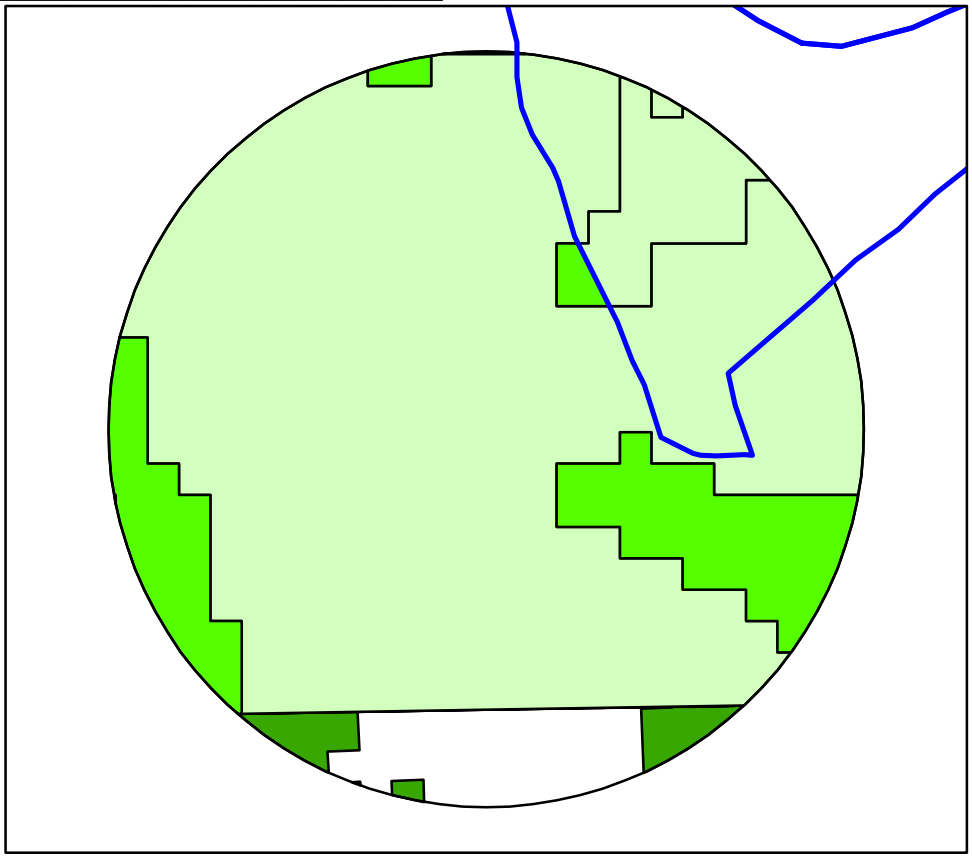


EVANS CREEK
NEST PATCH SITE # 4030O

1:6,000

1 inch = 500 feet

N
W E
S



Legend

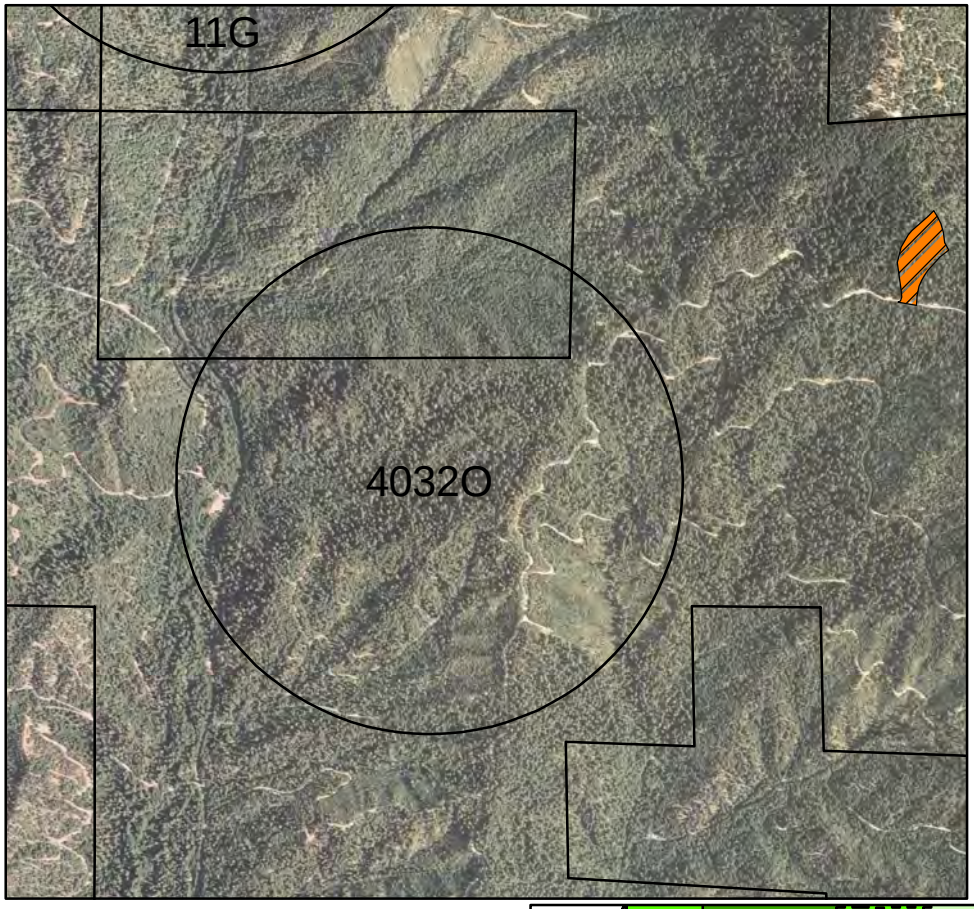
- Evans Creek Units
- Private Ownership
- Capable
- Dispersal
- NRF
- Non-Habitat
- Non-Suitable

United States Department of the Interior
Bureau of Land Management
Medford District Office
3040 Biddle Road
Medford, Oregon 97504-4180

700 Feet

D. Roelofs
2011

Appendix E Map 2



EVANS CREEK
SITE # 4032O

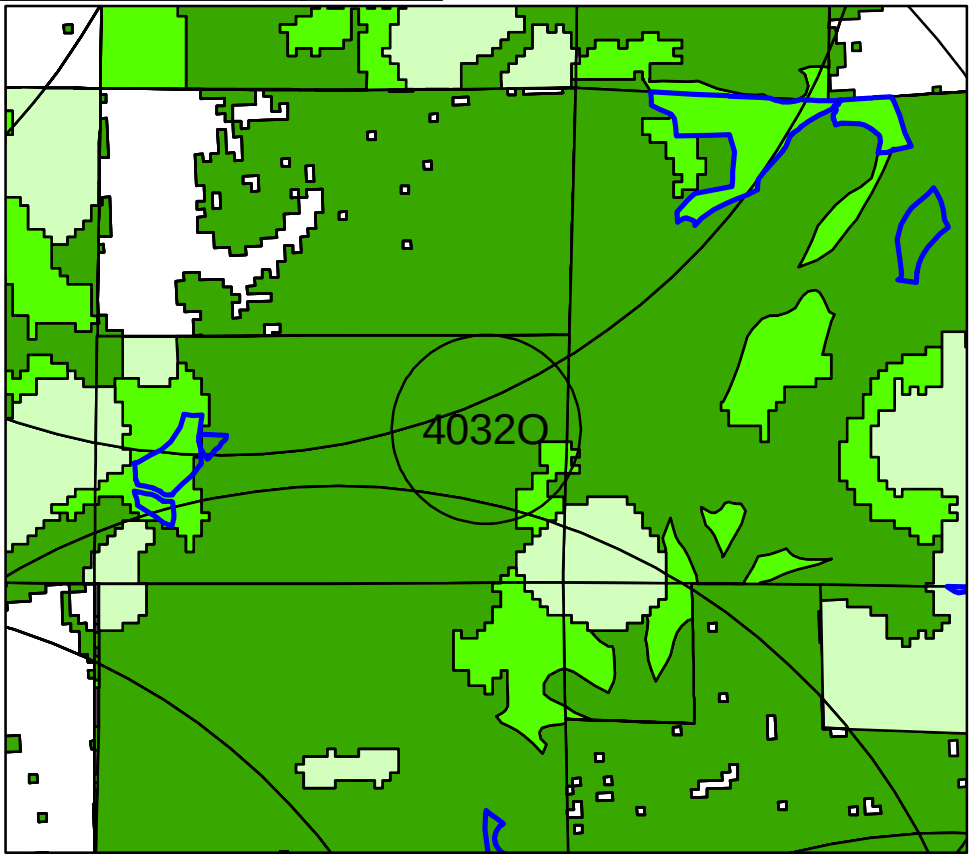
1:24,000

1 inch = 2,000 feet

N
W E
S

Cores Half Mile

NRF Downgrade



Legend

- Nest Patch
- Evans Creek Units
- Private Ownership
- Capable
- Dispersal
- NRF
- Non-Habitat
- Non-Suitable

United States Department of the Interior
Bureau of Land Management
Medford District Office
3040 Biddle Road
Medford, Oregon 97504-4180

2,600 Feet

D. Roelofs
2011