



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Roseburg Field Office
2900 Stewart Parkway
Roseburg, Oregon
Phone: (541) 957-3474 FAX: (541) 957-3475



Reply To: 8330.05113 (03)
File Name: RVBO0408.doc
TS Number: 03-4483

(12/01/03 corrections) October 20, 2003

Tim Reuwsaat
District Manager
Medford District BLM
3040 Biddle Road
Medford, OR 97504

Scott Conroy
Forest Supervisor
Siskiyou and Rogue River National Forests
333 W 8th Ave.
Medford, OR 97501

Re: Formal and informal consultation on activities that may affect listed species in the Rogue River Basin for fiscal year 2004 through fiscal year (FY) 2008 (log # 1-14-03-F-511)

Dear Mr. Conroy and Mr. Reuwsaat,

This document transmits the Fish and Wildlife Service's (Service) biological opinion (Opinion) based on our review of the Bureau of Land Management's (BLM) and the Forest Service's (FS) proposed FY 2004-FY 2008 forest management activities for the Medford BLM District and the Rogue River and Siskiyou National Forests (hereafter collectively referred to as the SW Oregon administrative units) in the Rogue River Basin, Oregon. This Opinion was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)(Act). Your request for formal consultation was received in our office on July 15, 2003.

At issue are the effects of the proposed action on the following listed species and critical habitats: threatened northern spotted owl (*Strix occidentalis caurina*) (spotted owl); threatened marbled murrelet (*Brachyramphus marmoratus*) (murrelet); threatened bald eagle (*Haliaeetus leucocephalus*); threatened vernal pool fairy shrimp (*Branchinecta lynchi*); endangered Gentner's fritillary (*Fritillaria gentneri*); endangered Cook's Lomatium (*Lomatium cookii*); endangered large-flowered wooly meadowfoam (*Limnanthes floccosa* ssp. *grandiflora*); endangered McDonald's rockcress (*Arabis mcdonaldiana*); and critical habitat for the spotted owl, murrelet, and the vernal pool fairy shrimp.

This Opinion is based on the following major sources of information: the SW Oregon administrative units' July 15, 2003, Biological Assessment (Assessment); the SW Oregon administrative units' June 10, 2003, draft assessment; various Level 1 team meetings in 2003; the document entitled *Forest Ecosystem Management: an Ecological, Economic, and Social Assessment* (USDA et al. 1993) (FEMAT); the document entitled *Northwest Forest Plan* (NWFP) (USDA and USDI 1994a); the document entitled *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 (USDA and USDI 1994b) (FSEIS); the Service's biological opinion on the NWFP (Service 1994); and numerous in-person, e-mail and phone discussions between David Clayton and Craig Tuss of the Service and Carole Jorgensen, George Arnold, and Mark Mousseaux of the Medford BLM District, and Lee Webb of the Siskiyou and Rogue River National Forests.

Consultation History

On February 10, 1994, the Service issued the Forest Service and the BLM a non-jeopardy biological opinion (1-7-94-F-14) addressing the adoption of the NWFP and its effect on all listed species within the range of the spotted owl. This opinion did not address any incidental take of spotted owls or murrelets because the proposed action lacked sufficient details to do so. Such analyses were deferred to future project-scale consultations where more specific information would be available on baseline (action area) conditions and project-related activities.

In 1996, the Service followed up the NWFP-scale consultation with a sub-provincial scale consultation (1-7-96-F-392) that addressed the entire forest management program for the SW Oregon administrative units. This regional consultation effort addressed the impacts associated with a 2-year timber sale program and a 10-year program for all other forest management activities that may affect listed species and critical habitat. Our 1996 Opinion addressed the loss of 29,805 acres of suitable spotted owl habitat (inclusive of nesting, roosting and foraging habitat [NRF]), of which only 13,379 acres were actually removed or scheduled for removal (Service 2001). The environmental baseline for the SW Oregon administrative units was subsequently adjusted to reflect the fact that 16,426 of the 29,805 acres of NRF addressed in the 1996 biological opinion were not removed or scheduled for removal.

In September 1998, a second consultation (1-7-98-F-321) for two years of timber sales was completed to cover activities on the SW Oregon administrative units in FYs 1999 and 2000. The Opinion addressed 51,427 acres of timber harvest that included the removal of 27,977 acres of NRF. Due to operational constraints and a court-ordered injunction resulting from a lawsuit on Survey and Manage species, only 3,417 acres of NRF were harvested under the action addressed in our 1998 biological opinion (Service 2001c). The environmental baseline for the SW Oregon administrative units was subsequently adjusted to reflect the fact that 24,560 of the 27,977 acres of NRF addressed in the 1998 Opinion were not removed or scheduled for removal.

In June 2001, the Service completed a range-wide assessment of consulted-on effects to the spotted owl and its critical habitat from 1994 to 2001 (Service 2001a). The same type of assessment was also done at the scale of the SW Oregon administrative units (Service 2001b). These baseline evaluations, which are updated periodically, are considered important information and have been used in this biological opinion along with changes since that update to characterize the range-wide and action area condition of the spotted owl and its critical habitat.

On October 12, 2001, a third consultation (1-7-01-F-032) was completed to cover 22,227 acres of timber sale activities on the SW Oregon administrative units in FYs 2001, 2002, and 2003.

The actual NRF reduction in FY 2001 was zero. In FY 2002, the actual NRF reduction was 4,335 acres. The SW Oregon administrative units expect 6,679 acres of NRF will be removed or downgraded to non-NRF by the end of FY 2003. The environmental baseline for the SW Oregon administrative units will be adjusted by returning 11,213 acres of NRF back to the baseline.

In April, May and June of 2003, the Level 1 interagency team, as well as other staff from the Forest Service, BLM and the Service, prepared several drafts of the Assessment addressing the FY 04-08 program of forest management activities on the SW Oregon administrative units.

In early June 2003, the Service received a draft Assessment for review; an edited draft Assessment was provided to the SW Oregon administrative units in mid-June 2003.

The Service received the final Assessment for the proposed actions addressed herein on July 15, 2003. The SW Oregon administrative units and the Service continued to work together on the formulation of the BO throughout August and September and the units continued to provide additional information to the Service during that time in order to fine tune their proposed action.

On September 12, 2003, a draft of this Opinion was provided to the SW Oregon administrative units for their review.

BIOLOGICAL OPINION

I. Description of Proposed Action

The action area for the proposed action includes all of the lands managed by the SW Oregon administrative units. Although the majority of these lands lie within the Rogue River Basin in Oregon, portions of the Klamath, Smith, and Umpqua River Basins, and several small watersheds along the south coast of Oregon that are not part of these larger basins are also managed by these units. The action area also includes portions of California in the Illinois and Applegate watersheds; both of these watersheds drain into the Rogue River.

This Opinion covers only those actions, including timber sales that are implemented in FY04-08. For tracking purposes the sell date of a timber sale is considered to be the implementation date. If a sale is not sold during the specific time period covered by this Opinion, the sale will have to be reconsidered in a subsequent consultation effort. The one exception is for sales that will be awarded but not actually sold. For those sales, such as 318 Alternative Volume (ATV) sales, the award date is the implementation date. Harvest of timber sales often occurs several years after the sale date.

Project design criteria (PDC) are part of the proposed action and are further discussed below. PDC are conservation measures developed to reduce impacts to listed species. Mandatory PDC will be incorporated into all activities under the proposed action, unless thoroughly reviewed and exempted through consensus by Level 1 team members. The Level 1 team will evaluate any deviations in proposed projects or mandatory PDC to ensure the deviations are consistent with the scope, extent, and effects of projects and PDC analyzed in this Opinion. 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 considered in compliance with this Opinion.

The proposed actions addressed herein are grouped into the general categories described below. These categories are not necessarily distinct and may have considerable overlap. The predicted scope and amount (acres, miles, number of projects, etc) of these activities are reported under only one category. For instance, although roads are sometimes part of tree harvest actions, all road miles from all activities are reported under “road engineering” projects; this reporting of projects avoids overestimating the miles of impact associated with roads. The proposed action includes the following:

- A. **Timber harvest** includes various levels of: regeneration harvest, commercial thinning, selective harvest, density management, commercial firewood, hazard tree removal, and opportunistic salvage
- B. **Vegetation management** includes silvicultural activities consisting of but not limited to; stand density management, conversion, fertilization, pruning, pre-commercial thinning, Port-Orford-cedar sanitation, riparian thinning, animal damage control (gopher baiting), slash piling, and burning.
- C. **Special forest products** includes personal use firewood, cedar bough harvest, Christmas trees, Port-Orford-cedar arrow wood sales, mushroom harvest, brush and bear grass cuttings, medicinal plants, pole-size timber, burl and rock removal.
- D. **Watershed restoration** includes culvert repair/replacement, road restoration or decommissioning, slope stabilization, habitat improvement projects, stream improvement projects, including tree lining/felling, down wood, and snag creation.
- E. **Fuels management and Wildfire Suppression** includes slash piling, prescribed burning, thinning, and brush treatments.
- F. **Recreation** includes trail construction and maintenance, campground maintenance and development, facilities maintenance and development.
- G. **Livestock grazing** includes allotment renewals, fence construction and maintenance, spring improvements and maintenance.
- H. **Road Maintenance/Construction** includes maintenance, restoration or decommissioning, culvert replacement and repair, bridge maintenance and repair, and road re-alignment.
- I. **Road Use Permits** for specific current applications for right-of-way agreements and road use permits across federal lands.
- J. **Other Special Use Authorizations (permits)** include research collecting, commercial permits, group permits, cell towers, power-lines, utility corridors, and other utility facilities.

- K. **Mining and Quarry Operations** includes casual use, notice and plan level permits and operations, and commercial quarries on BLM lands.
- L. **Cultural resources** include historical bridge and building repair or replacement and archeological digs.
- M. **Weed Control** includes mechanical, biological, and chemical controls.

The following activities are also part of the proposed action but will require separate consultation at the individual project scale because their impacts are too variable to predict at a program scale:

1. New Road Use Permits (other than existing applications)
2. Off-highway vehicle authorizations
3. Land Exchange/Realty Actions
4. Research projects with Likely to Adversely Affect (LAA) potential
5. Wildland fire
6. Sudden Oak Death (SOD)

The SW Oregon administrative units practice adaptive management as described in the NWFP. Adaptive management allows minor project variations to meet site-specific conditions or landscape objectives. Therefore, there may be minor deviations in the projects addressed herein over the 5-year life span of this Opinion. This Opinion will cover these minor alterations in project activities if the following conditions are met: (1) the project complies with the NWFP; (2) the project complies with the Resource Management Plan (RMP) or Land and Resource Management Plan (LRMP) to which it is tiered; (3) the impacts and extent of the project are within the parameters of described activities in this Opinion, this includes impacts to specific Land Use Allocations (LUAs), watersheds, Resource Areas or Ranger Districts, and Critical Habitat Units (CHUs); (4) the minor deviations are reviewed by the Level 1 team to ensure impacts to listed species remain the same or less than those described within this Opinion; (5) minimization measures proposed for the project are consistent with the intent and impacts of actions described in this Opinion; and (6) project impacts are reported to the Service in annual monitoring reports.

Separate consultation will be required to meet compliance with section 7 of the Act if the project cannot be revised to comply with the above or if the Level 1 team cannot reach consensus that the project deviation meets the intent, extent and impacts addressed in this Opinion.

2 and the text below describe the scope of the proposed action. The combined acres of habitat impacts are summarized and evaluated in the “Effects of the Action” section of this Opinion. Except where noted, the following activities can occur in any land use allocation. Acres are shown for a five-year program.

Table 1. Proposed Action					
Project category		Estimated scope (acres, etc)			
A	Tree harvest (totals are sum of all five years of this Opinion)	Total Ares with disturbance to Spotted Owl	Acres NRF* Removed or Down-graded to Dispersal	Acres Dispersal Habitat Removed	Murrelet Nesting Habitat Removed (Areas A and B)
	<i>All Land Allocations</i>	25,000 of which 8,500 may occur during sensitive periods	31,621 (corrected 12/01/03)	4,957	3,680
	<i>Late-successional Reserve(LSR) Subset</i>	3,500	1,137	705	450
	* <i>NRF = Nesting, Roosting, Foraging habitat</i>	An estimated 25,000 acres of spotted owl habitat may be disturbed by timber sale activities during the life of this Opinion. Removal or downgrading of habitat in LSR is related to meadow restoration projects. 22,000 acres of salvage may occur in the Biscuit Fire area (7,000 acres in Matrix and 15,000 in LSR). Up to 3,000 acres of salvage may occur in the Timbered Rock Fire area, all in LSR. None of these salvage acres would be habitat for listed species. Salvage may also occur as the result of future fires, disease, wind, and other natural events. Up to 290 miles of fuel breaks may be created or maintained in the Biscuit Fire area. 2,070 acres and 1,610 acres of murrelet habitat would be removed or downgraded in Area A and B respectively (150 and 300 acres in LSR, all related to meadow restoration projects). Up to 20 miles of timber sale-associated roads may be constructed per year. Suitable habitat removal associated with roads is listed above, but effects are described under road maintenance/construction. The small amount of suitable habitat removal due to commercial firewood, incidental thinning, hazard tree removal, and other tree harvest is included above.			
B	Vegetation management, including Silviculture	<p><i>Pre-commercial Thinning/brushing/site preparation:</i> BLM 12,700 acres/year. FS 4,000 acres/year. Up to 20 percent within LSRs.</p> <p><i>Planting:</i> BLM 6,150 acres/year, FS 5,000 acre/year</p> <p><i>Aerial Fertilization.</i> BLM No more than 55,500 acres of fertilizer applied over the life of the Opinion (11,100 acres per year). (There is currently a legal moratorium on aerial fertilization). FS does very little, if any, fertilization.</p> <p><i>Gopher control:</i> BLM 500 acres/yr, trapping; FS, 500 acres/yr, trapping & poison</p> <p>Seed orchards involve treatments not used across all lands. They are covered under separate consultation. See (USDI Bureau of Land Management 2003-Draft EIS Integrated Pest Management, Provolt Seed Orchard, Charles A. Sprague Seed Orchard. Medford BLM. June 2003).</p>			
C	Special Forest products	<p>Boughs: BLM 30 tons/yr, FS 116 tons/yr</p> <p>Christmas trees: BLM 1,500 trees/yr, FS 8,700 trees/yr</p> <p>Burls: BLM 40 tons/yr, FS 5 tons/yr</p>			

		<p>Edibles and Medicinal plants: BLM 6 Tons per year, FS 12 tons/yr Floral greenery: BLM 75 tons/yr, FS 33 tons/yr Mushrooms (morels, matsutake, chanterelles): BLM 3 tons/yr, FS 8 tons/yr Post/Poles: BLM 230mbf/yr, FS SIS 900 pieces/yr, FS ROR Poles 32,000 lf/yr Mosses/Lichens: BLM 500 lbs/yr, FS 900 lbs/yr Transplants 200 plants, FS 3000/yr Seeds/Cones: BLM 40 bushels, FS 95 bushels/yr Fire wood: 1000 cords/yr</p>
D	Watershed restoration	<p>BLM: Meadow / flood plain restoration 50 acres/yr Stream structures 15/yr Culvert replacement/repair: 12 large fish passage culverts/yr; 50 cross culverts/yr Road obliteration 30 miles/yr ; Road closure 30 miles/yr FS: Fish habitat restoration 60 acres/yr, 5 miles/yr Road drainage improvement 320 acres/yr Restore native plants 20 acres/yr Riparian restoration 100 acres/yr Wildlife habitat/meadow restoration 120 acres/yr (see also A = Tree harvest) Slide and riparian restoration 95 acres/yr Fish habitat improvement 5 miles/yr, passage/culvert replacement 5/yr BLM/FS: General wildlife habitat enhancement/yr – tree top blasting (200 trees), underburn (500 acres), brushing (200 acres), road obliteration (see above), riparian thinning (see vegetation management). See also H = Roads maintenance/construction below.</p>
E	Fuels Management and Wildfire Suppression Activities	<p>BLM 15,000 acres of mechanical or hand fuels reduction/yr; FS 5,000 acres/yr BLM 10,000 acres of prescribed burning/yr; FS 2,000 acres/yr (up to 7,000 salvage acres may be treated in the Biscuit Fire area). (Some acres are treated in steps, such as pile construction in year 1 and pile burning in year 2 – these same acres are counted in each year)</p>
F	Recreation	<p>Facility development – construction or reconstruction may impact 50 acres per year for BLM and 60 acres per year for FS. 10 projects total/yr Permits (see Special Use Permits) BLM maintenance 100 trail miles and 50 acres of campgrounds and other facilities; FS 100 miles and 250 acres per year BLM 30 recreation projects/yr with noise disturbance potential; FS 10 acres/yr BLM 10 miles of new trail construction/year; FS 1 mile/yr</p>
G	Livestock Grazing	<p>BLM - 97 Cattle allotments on 339,362 acres with 14,659 Animal Unit Months (AUM = one cow and calf for one month) (35 Allotments on 106,064 acres for 9,811 AUMs, are currently vacant). Siskiyou National Forest - 6 active cattle allotments on 13,882 acres with 593 AUMs; 5 vacant allotments on 169,683 acres. Rogue River - 20 active cattle allotments on 571, 211 acres with 13,766 AUMs; 1 vacant allotment on 23,160 acres.</p>
H	Road maintenance/construction	<p>BLM up to 500 miles of road maintenance/repair/yr. FS up to 900 miles of road maintenance/repair/yr. BLM and FS up to 20 miles per year, including roads associated with timber</p>

		harvest.
I	Road Use Permits	One current application: Rough and Ready Co. R-O-W, T39S R6W, Section 29 SE of the SE of the SE (Lost Canyon), Illinois Valley Ranger District, Siskiyou National Forest. 1.2 acres of late-successional habitat in LSR would be removed. Any future applications for ROW permits that “may affect” listed species will require separate consultation with the Service.
J	Other Special Land Use Authorizations (permits)	Cell towers, power-lines, utility corridors, research collections, etc. Maintenance of existing utility right of ways. Up to 600 special use permits/yr for water lines, impoundments, trail use, site use (groups), fishing guides, recreation residences, one-time special events.
K	Mining and Quarry Operations	BLM: Notice-level operations, 10 per year involving less than 25 acres total Plan-level operations, 2 per year on no more than 50 acres total Permits for rock from quarries, 80 permits per year, 400 for the life of the Opinion New rock quarries, 1 per year, 5 for the life of the Opinion. Mine reclamations (1 per year). FS: Each year up to 250 small-scale suction dredge operations are conducted on the Siskiyou and Rogue River National Forests. Other, larger-scale operations are likely; two or three of these can be expected annually.
L	Cultural Resources	BLM: 2 excavations per year; Whiskey creek cabin restoration; Williams Creek bridge restoration (2 for the life of the plan), historic cemetery restoration (2 for the life of the plan). 20 acres total. FS: 2 excavations – 20 acres/yr
M	Weed control	BLM: treat up to 2,000 acres per year on average, using a combination of manual, biological, and chemical (spot) control methods, up to 10,000 acres for the life of the Opinion. FS: The Rogue River and Siskiyou are expected to treat up to 1,100 acres a year by biological, mechanical, manual, and chemical means. Up to 500 acres are chemically treated annually on the Rogue River and Siskiyou National Forests.

Detailed descriptions of these activities are presented below.

A. Tree Harvest (FY 04-08)

Annual Timber Program for the Rogue River/South Coast Basins. Silvicultural techniques employed to attain harvest levels include various density management and stand regeneration prescriptions. Depending on site conditions, plus stand condition and management objectives, harvest rates range from approximately 2-15 MBF and 15-50 MBF per acre for density management and regeneration harvest, respectively. The acreage projected for harvest in FY 04-08 reflects the predominant use of density management treatments in meeting the annual harvest level.

Tree harvest includes usually commercial and occasionally non-commercial removal of mature overstory and/or understory trees and can include regeneration harvest, seed-tree cuts, selective harvest, salvage, density management, commercial thinning, and individual tree removal. Tree harvest also covers miscellaneous projects, including the removal of hazard trees for public safety, commercial firewood, and opportunistic salvage. Opportunistic salvage sales result from blowdown (other than hazard trees), disease, or small fires. Commercial timber is generally classified as trees 8” or greater in dbh. Typically, a blowdown salvage project may cover 500

acres or more along at least 50 miles of roadway. However, based on past experience, salvage can occur on as much as 10,000 acres in a given year. Normally, the basic structure of the stand will be retained. This type of salvage may occur within LSRs and Riparian Reserves; the standards and guidelines in the Northwest Forest Plan and LSR Assessments are met. Any projects in LSRs or Riparian Reserves that result in habitat loss or degradation for spotted owl or marbled murrelet will be reviewed by the Level 1 team; consultation with the Service will be reinitiated where necessary.

Harvest can result in the removal of a few trees within a stand or can result in removal of the majority of trees within the project area. Openings may occur in an even or patchy distribution, depending on objectives of the treatment and constraints of the land use allocation. Trees are harvested by individual sawyers, or crews of people with chain saws or machine-mounted saws. Harvest includes the layout, marking, falling, limbing, yarding, and decking the trees to be removed from the site. In all cases but biomass removal, the limbs and needles/branches remain within the project area, and the bole of the harvested tree is removed. Trees are hauled to landings by cable, heavy equipment, or helicopters. Trees are removed from decks or landings by logging trucks or helicopters. Access to the timber sale involves the use of existing roads (see road maintenance) in areas where roads already occur, and can also involve the design and development of new roads. New roads involve cutting trees from the road prism, occasional blasting, grading, hauling gravel, cutting into side banks, installing culverts and waterbars and stabilizing adjacent areas. Trees removed from road prisms are often decked for inclusion in the timber sale, or could be sold in unrelated sales, or could occasionally be used on-site or off-site for watershed restoration, down wood supplementation, or in-stream structures.

The size of the harvest Action Area is related to the intensity of activity. Regeneration harvest units, which remove the majority of trees from the Action Area, cover a smaller surface area than density management or selective harvest, which removes fewer trees, maintains more residual trees, but covers more surface area to obtain the same volume. Regeneration harvests could occur in the Adaptive Management Area (AMA) and Matrix, but do not occur in LSRs or Riparian Reserve (RR). Meadow restoration projects in LSR will result in the removal of some suitable habitat (see Table 1). Timber sales within LSRs will comply with pre-approved LSR direction (*i.e.* completed LSR assessments, as per the NWFP Record of decision (ROD)).

Timber harvest is seasonally restricted around known spotted owl nest sites (see PDC for details). Some harvest could occur in suitable Matrix and AMA habitat that has not been surveyed for spotted owls. All timber sale contracts will contain special provision E-4 (BLM) or C6.25 (FS). These are standard contract standards which require purchasers to discontinue operations upon receiving written notice from the BLM or FS that listed species may be affected by the action; an example situation might be when a previously unknown spotted owl nest is discovered in an active timber sale.

Various types of thinning, density management, or selective harvest can occur in all land use allocations, if the harvest meets the objective of the land use allocation, as specified in the NWFP. Selective harvest techniques can result in project areas that often cover large acreages (several thousand acres), and contain stands with 120 – 140 feet of basal area per acre, 40 – 50 trees per acre, and average canopy coverage of 40-60 percent.

B. Vegetation Management - including Silvicultural Projects

Silvicultural projects usually involve plantation maintenance and the removal of trees and shrubs to enhance growth, and can include maintenance brushing (release), precommercial thinning, prescribed burning for site preparation (see also fuels reduction), planting, Port-Orford-cedar clearing (sanitation) to control *Phytophthora lateralis*, animal damage control, fertilization, and pruning. Silvicultural activities are sometimes collectively referred to as TSI projects (Timber Stand Improvement). Thinning work is usually done with hand crews, but mechanical thinning can occur. Grain treated with Strychnine alkaloid is in use on National Forest lands to control gophers where they have been identified as a cause of plantation failure or unacceptable conifer stocking levels. The SW Oregon administrative units also use underground traps. Fertilizer is applied to accelerate growth of young trees or to improve native plant restoration. Fertilizer is applied at a rate of no more than 200 lbs of nitrogen per acre. Fertilizer is usually aerially applied, but is hand applied in some habitat improvement projects on small acres (e.g. grass seeding in meadow habitat improvement projects).

C. Special Forest Products

Special forest products consist of, but are not limited to: personal use firewood (see also commercial firewood in tree harvest), cedar bough harvest, Christmas trees, Port-Orford-cedar arrow wood sales, mushroom harvest, brush and bear grass cuttings, medicinal plants, pole-size timber, burl removal. These types of activities usually occur in a relatively small (less than 10 acres) area and may, in some cases, affect suitable habitat for listed or proposed species (such as mushroom harvesting). These activities require personal and commercial use permits through the SW Oregon administrative units. For activities designated as concentrated use (such as designated firewood cutting areas), plant and wildlife surveys or habitat evaluations would be required. Commercial mushroom harvests are dispersed across the landscape.

D. Watershed Restoration

Watershed restoration projects anticipated in the Action Area include: road decommissioning, storm proofing of roads (see road maintenance/decommissioning below), upslope erosion rehabilitation, riparian silviculture, in-stream habitat improvement, large wood restoration, wildlife tree development, wildlife habitat restoration and enhancement (such as meadows), and prescribed burning (see fuels management). Some blasting (such as snag creation) may occur with watershed restoration projects.

Roads no longer essential for forest management may be gated, closed or decommissioned (put back to natural contours). Roads with the potential to fail or deliver large amounts of sediment to stream segments may be decommissioned or closed or may be improved. Improvements include repairing road drainage facilities (culverts, drain dips, etc.) and surfacing (to reduce sediment). Restoration activities could include snag creation. Down wood development or placement could occur. Effects are similar to tree harvest or silviculture projects. Meadow restoration, fencing, native plant seeding and planting, and weed removal may occur to restore or repair healthy ecosystems. Most watershed restoration projects will take place in Key Watersheds identified in the Forest Plans. Other restoration work may be required as the result

of future wind, snowstorms, rain, and flooding. Expected activities and effects specific to roads are evaluated under road construction and maintenance (below), although road construction, restoration, maintenance, and drainage work is interdependent and interrelated to most Action Agency activities. No ground disturbance will occur without plant and wildlife surveys or an evaluation for habitat of listed species.

E. Fuels Management and Wildfire Suppression Activities

Much of the Action Area has short natural fire return intervals. Years of fire suppression have resulted in habitat conditions much brushier and denser than would occur under natural burn regimes. Fuels management has three primary purposes: fuels reduction to reduce wildfire hazard, site preparation/slash reduction for improving conifer planting (covered in silviculture above), and restoration of ecosystem function where wildfire has been suppressed.

Fuels management includes manual and/or mechanical treatments using chainsaws or mechanical equipment such as slash busters, followed up with prescribed fire (pile burning or under-burns). Broadcast burning without pre-treatment (brush fields) can also occur. Mechanical treatment is designed to convert abnormally high amounts of shrubs and ladder fuels so that subsequent prescribed burning or wildfire won't be as severe. The material (piled) with manual treatment is usually burned once that material dries out. A small portion of the acres treated by mechanical equipment may also be burned to remove treated material.

Prescribed fire use is dependent upon management objectives. The primary role of prescribed fire has traditionally been for site preparation and fuels reduction. Recently, natural fuels reduction and ecological "improvement" have become end goals of prescribed fire. The effects of prescribed natural fire, when limited to the prescription, can usually be controlled or manipulated. Currently, a draft Wildland Fire Use plan has been developed for the Kalmiopsis Wilderness of the Siskiyou National Forest; when this plan is implemented, natural fire may be allowed to burn, under prescribed conditions. The Kalmiopsis plan may later be expanded to cover nearby roadless areas.

Prescribed burning is generally restricted to spring or a small time period in the fall, due to risks of escapes, smoke concerns, and the weather. When successful understory treatments have been completed, and risks of escape are reduced, more burning during late summer or fall could be anticipated. Mechanical treatments can occur at any time of the year.

Natural and created fuel breaks across the landscape may be developed to help with the suppression of large-scale wildfires. In this case, treatment of fuels along a ridge or topographic break would occur to reduce the fuels and facilitate suppression activities. Fire line construction and blasting may occur as a tool to help create fire lines. No treatments will occur without plant and wildlife surveys or evaluation for habitat of listed species.

F. Recreation

Recreation management includes trail construction and maintenance, campground and physical facilities maintenance, boat landing maintenance, observation decks and guard rails, signing, foot bridges, and permits for rafting and boating (see special use permits). Ground or habitat disturbing actions will not occur without plant and wildlife surveys or an evaluation for habitat of listed species. Occasional heavy equipment use could cause short-term (less than one week)

high noise levels, and occasional groups of people may be concentrated along short sections of a trail or river for various periods of time. Trees may be felled in developed areas or along trails where public safety is a concern (this is generally an annual activity).

G. Livestock Grazing

The BLM has 97 free-range allotments identified in the RMP covering 339,362 acres, of which 35 are currently vacant (106,064 acres). The total Animal Unit Months (AUMs) currently preferred (Medford BLM, Range Program Summary, 2001) is 14,659, however of these, 1,494 AUMs are in the 35 vacant allotments. The preferred AUM identified in the Medford RMP was 16,466. Allotments occur in all land use designations, including Area of Critical Environmental Concern (ACECs) or Research Natural Areas (RNAs), BLM wilderness study areas, AMA, Matrix, and LSRs. Two small allotments totaling 164 acres and 185 AUMs are administered by the Bureau of Reclamation at Emigrant Lake.

The Siskiyou National Forest has six active cattle allotments on 13,882 acres, with 593 AUMs; five allotments are vacant (169,683 acres). The Rogue River National Forest has 20 active cattle allotments on 571, 211 acres, with 13,766 AUMs; one allotment is vacant (23,160 acres). Vacant allotments are still valid allotments that could be applied for and utilized within the next five years, although this is unlikely. In any given year an allotment can be in “non-use,” depending on the permittees needs, the market, or cooperative agreements between the BLM and the permittee on rangeland health issues and forage recovery. Allotments range in size from 40 acres, with 3 AUMs to 35,471 acres with 2,694 AUMs authorized.

Actions to improve allotments can occur in any year and could include fence building (barbed wire, high tensile lay-down, pole) and fence repair, cattle-guards, water impoundments (spring boxes, stock tanks, ditching, pipes) and repairs, swing gates across riparian zones, and riparian and forage enhancement (*e.g.* grass seeding, shrub plantings). No more than a dozen improvement projects are likely in any year given current funding trends. Most of those involve the maintenance of existing improvements (fences, cattle guards and spring boxes). No ground disturbance or surface vegetation removal would occur without plant and wildlife surveys or evaluation for habitat of listed species. Prior to the 10 year permit renewal of allotments, evaluations for listed species will occur. Appropriate PDC are applied as necessary.

H. Road Maintenance/construction

Road construction involves ground disturbance, removal of vegetation, heavy equipment, occasional blasting, periods of high noise and activity, and would be tied to tree harvest, recreation, and several other project categories. Road maintenance consists of grading, brushing, culvert maintenance and repair, installing and repairing waterbars, minor resurfacing, and occasional hazard tree removal or minor re-routing. The SW Oregon administrative units maintain roads on a schedule, but also respond to unanticipated repairs due to weather, accident, or landslide. Most activity is limited to short periods of time (*i.e.*, one or two passes with a grader). Road grading generally affects the ditch and a foot or so of the cut-slope; some loose material is spilled over the fill-slope. Maintenance brushing generally entails mechanically

cutting brush down to less than a foot high within four feet of the edge of road tread. Brush more than four feet from the edge of the road tread is not treated. Heavy trucks and heavy equipment such as graders, gravel trucks, backhoes, and chainsaws and/or brush removal machinery, can increase noise in the area of activity for short, but intense, periods of time, and can occur for up to one week in time. Most activities would require a few hours of work or less within any 0.25-mile road segment in a 24-hour period. Some blasting may be required where road projects result in the removal of unstable portions of the cut-slope, often at rockfaces.

Road decommissioning is tied to Watershed Restoration and covers activities that reduce or eliminate traffic use on the road by installing gates, barriers, rocks, ripping the tread, pulling culverts, and seeding grass and herbs. Full obliteration of the road returns the road back to natural contour levels using excavators. The more intensive road obliteration could impact 0.25 mile sections of road for up to a week with intense, loud equipment activity. Full obliteration also can remove vegetation along the top of the cut slope to create a stable slope.

I. Road Use Permits

Landowners or their agents are required to obtain Road Use Permits to build roads across BLM/FS managed land for commercial purposes and/or to haul commercial products on BLM/FS maintained road systems if these permits are not already in place. Federal discretion to influence the implementation of recovery efforts for threatened or endangered species may be limited where certain pre-existing Road Use or Reciprocal Right-of-Way agreements exist between private landowners and the SW Oregon administrative units. Most existing road activities in the Action Area are already covered by reciprocal rights of ways with private parties and the SW Oregon administrative units no longer have discretion. Section 9 prohibitions (ESA) are the responsibility of the applicant in situations when federal discretion is not retained. This Opinion does not address non-discretionary activities. For the purpose of this Opinion, private lands refer to privately-owned or other government non-federal) parcels located as inholdings or adjoining property through which access is traditionally granted across federally managed lands.

On 30 January 2003, a new multi-agency Road Use Permit policy (*Application of the Endangered Species Act to proposals for access to non-federal lands across lands administered by the Bureau of Land Management and the Forest Service*) was instituted. The Bureau of Land Management, Forest Service, Fish and Wildlife Service, and NOAA (National Oceanic and Atmospheric Administration) Fisheries are signatories to this policy. The provisions of this agreement apply when a Forest Service special use authorization or a BLM right-of-way grant is required for the reconstruction or construction of a road or landing, for either private or commercial purposes, to secure access to a parcel of non-federal land. The key components of the interagency agreement are:

1. The agreement applies to grants of rights-of-way across National Forest System and/or public lands administered by the BLM, under their respective authorities, for purposes of access to non-federal lands.

2. The “proposed federal action” to which the agreement applies is the authorization for access across federal land and subsequent activities on federal land, it does not include any actions on non-federal lands unless the applicant requests incidental take un the Section 7 process.
3. The agreement clarifies that the FS and BLM will not include terms and conditions for access authorizations that will regulate activities on non-federal land unless the applicant desires incidental take coverage through the Section 7 process.
4. At the applicant’s discretion, the agreement provides applicants an option to include the effects of those activities that will be facilitated by the proposed access and conducted on the applicant’s non-federal lands as part of a federal agency Endangered Species Act consultation on the access application. If the applicant chooses not to include those non-federal activities, there is no ESA coverage from the consultation for any take associated with the activities on non-federal land.
5. The agreement does not apply to use of National Forest System roads for access to non-federal lands in situations where the use is already authorized. Such use is governed by the authorization in 36 CFR 212.6 and implementing procedures in Forest Service Manual (FSM) 7730 (*i.e.*, Road Use Permits).
6. Endangered Species Act sections 9 and 10 still apply to all activities on non-federal land.
7. The agreement applies to applications for new authorizations for access that are processed by the FS and BLM after January 30, 2003.

Notwithstanding the above, interpretation and implementation of this new policy must be consistent with the scope and authority of the implementing regulations for section 7 of the Act at 50 CFR Part 402.

For the Forest Service, Interim Directive Number 7709.59-2003-1 (22 May 2003) covers those Road Use Permits (RUP) requested for use of existing roads open to the public (expires November 22, 2004). In these situations, “NEPA and ESA procedures are not applicable when a road permit is issued for commercial use of an existing road that is generally available to public use and suitable for planned commercial use without reconstruction.”

Road building (construction or reconstruction) will be authorized on federally managed land under the terms of individual road use permits. Road construction, maintenance, and restoration activities were described under road maintenance/construction above. Use of National Forest roads to haul timber from private land (inholdings and adjoining property) will be the greatest part of this proposed action. Harvest of private lands normally consists of clear-cut or salvage operations, or removal of individual large diameter trees in young stands.

Each right of way road activity has distinct characteristics and effects that cannot be adequately anticipated in an analysis. RUP proposals that require consultation are included in this Opinion only if we have specific information to assess impacts: In this Opinion, only one RUP application meets this test. The Lost Canyon RUP application from Rough and Ready Company involves construction of an access road on National Forest land. The company has no way of accessing their property through existing roads, and their entire parcel is surrounded by NF land. The project is located in T39S R6W, Section 29 SE of the SE of the SE (Lost Canyon), on the Illinois Valley Ranger District, Siskiyou National Forest. The planned road crosses NE to SW at the “4-corner intersection” of two National Forest and two Private sections. This planned route will minimize the impact on federal lands, it is feasible to access the private parcel from the west, but the impact to NF land would be much greater (0.5 miles of road construction on NF land). The National Forest portion of the new road would be 800’ long by 66’ wide; 1.2 acres of late-successional habitat in the East IV LSR would be removed. The site is currently being surveyed for presence of spotted owls. If owls are found, PDC for tree harvest in the roadway will be followed. If a spotted owl activity center were found, the proposed road location would be modified to protect the nest site. NWFP Standards and Guidelines for ROWs (ROD C-19) are being followed.

Subsequent applications during the term of the proposed action will be analyzed under separate consultations, as appropriate.

J. Other Special Land use authorizations, special use permits, rights-of-way grants

The SW Oregon administrative units authorize various uses of federal land for utilities, public works, non-profit and commercial gatherings, water lines, National Guard training exercises, etc. Special Use Permits include requests for activities such as a water line for a private home, cell or radio towers, power-line right of ways; group gatherings, sponsored events, commercial tours, outfitter guides, field institutes, 4WD club outings, etc. These permits are discretionary and the SW Oregon administrative units can re-route activity locations or stipulate PDC to reduce impacts. Occasionally construction or maintenance of power lines or cellular towers result in the removal of trees or vegetation (see tree harvest). No surface vegetation would be removed without plant and wildlife surveys or evaluation for habitat of listed species.

K. Mining and Quarry Operations

For all mining activities on BLM-managed land, operators must submit a Notice of Intent and get approval, if causing surface disturbance on 5 acres or less. Operators only have to file a plan of operations for activities that remove more than 1,000 tons of material, which is generally on more than 5 acres. A few special exceptions apply, for instance, mining activities within ACECs, or areas known to contain proposed or listed species are required to have a plan of operations (BLM Manual Section 3809.11 part C(6)).

Plans of operations are required to comply with the ESA, and the operator must take such action as necessary to prevent adverse impacts to listed species. Habitat evaluation or surveys for new notice-level and plan-level operations will be done prior to commencement of operations.

Each year many small-scale suction dredge operations are conducted on the Siskiyou and Rogue River National Forests. Few miners are likely to notify District Rangers of their intent to operate, since regulations authorize most small-scale, low impact operations such as these, and do not require notification or approval. Field inspection, however, will be conducted and where actions are likely to significantly affect surface resources, a Plan of Operations will be required and site-specific NEPA and consultation will result. In many of these cases, the miner will choose to simply minimize or cease their operations to protect the resource and avoid the paperwork. Other, larger-scale operations are likely and the operator will provide a Notice of Intent or a Plan of Operations. Where actions are likely to significantly affect surface resources, a Plan of Operations will be required and site-specific NEPA and consultation will result.

Most mining operations presently operating on federal lands use suction dredges to sort streambed materials in search of gold. Much of the suction dredge mining is in key watersheds, e.g., Palmer Creek, Little Applegate River, Taylor Creek, Dunn Creek, East Fork Illinois River, Sucker Creek, Silver Creek, Elk River and South Fork Coquille River. Other watersheds with suction dredge activities on federal lands include Briggs Creek, Evans Creek, and the Chetco River. Except for a few large dredge operations, most suction dredging is performed with small portable dredge equipment. Suction dredging is widespread throughout the summer operating season - June 15th to September 15th – but operations vary from an occasional weekend to two weeks.

Most rock crushing operations take place in existing quarries. The SW Oregon administrative units often authorize an increase in quarry boundaries for timber sales. All actions take place within the developed quarry limits. Standard operations include drilling which takes approximately 2-3 weeks, blasting which is quick (less than one minute), but may extend over several days, and crushing which takes 2-3 weeks. All operations are well above ambient noise levels.

L. Cultural Resources

Cultural activities could involve one several-person crew digging and excavating historical and archeological areas. Generally, this is handwork, and has low noise associations. Occasional heavy equipment might be used to restore artifacts or historic places or to install protective barriers or fences around sensitive items. Such activities would be evaluated by biologists and botanists to ensure such activity would not impact T&E species.

M. Weed control

Weed control treatments include manual methods like mechanical brushing or mowing, sawing, hand-pulling, mulching, digging, grubbing, steaming, burning, seeding, or the introduction of biological control insects. Increased vehicle and ground crew activity could be present for short periods of time in any local (less than 2 weeks). Noxious weeds, as defined by the State of Oregon are the primary targets for treatment, but other invasives contrary to healthy ecological function could also be targeted for treatment (e.g. Himalayan blackberry). Weed control can involve the use of select herbicides sprayed from truck or All Terrain Vehicles (ATV) mounted sprayers, or more often backpack sprayers. The selected herbicides the BLM is authorized to

use are: Glyphosate (Round-up), 2-4-D, Pichloram (Tordon), and Dicamba (Banvil). Most herbicide treatments for noxious weeds use Glyphosate. The BLM is expected to treat no more than 2000 acres per year using all methods. The Forest Service is authorized to hand-spray Glyphosate, Pilloram, and Tryclopypyr (Garlon); up to 500 acres are treated annually on the Rogue River and Siskiyou National Forests. The Rogue River and Siskiyou are expected to treat no more than 1,100 acres a year by biological, mechanical, manual, and chemical means.

Treatments occur during the period of the year the targeted weeds are most susceptible to a particular treatment. The listed noxious weeds of most concern in the basin are: yellow starthistle, Canada thistle, meadow and spotted knapweed, puncture vine, Dalmatian toadflax, purple loosestrife, Dyer's woad, leafy spurge, and rush skeletonweed. New non-native weed species are being discovered in the sub-basin every year, and it is conceivable that new noxious weeds would be targeted for treatment within the life of this Opinion.

Tracking and Monitoring

Tracking and monitoring of activities covered by the Northwest Forest Plan *is* critical to determine if the plan is being properly implemented. Existing monitoring efforts include: 1) annually, approximately ten percent of timber sales across the region are randomly reviewed by the Research and Monitoring Committee (File code 1900, 14 May 96, from Mike Hupp, USDA Forest Service), 2) use of a consistency check-list for decision notices, by the Siskiyou National Forest, 3) on-site analysis of project completion by federal personnel, 4) annual monitoring program for timber sales by BLM, as well as consultation monitoring as required by 50 CFR 402.14(i)(3).

This consultation incorporates annual monitoring of Action Agency projects that have adverse effects to listed species. The Level 1 team has agreed to use a Project Implementation and Monitoring Form developed by the Service, most recently updated in October 2002, for use throughout western Oregon to report FY04-08 projects. Changes to the form will be agreed to by Level 1 team agreement. SW Oregon administrative units will report all LAA projects for the preceding fiscal year to the Service by October 31 of that year, unless otherwise scheduled by Level 1 team agreement.

II. Project Design Criteria

PDC are conservation measures incorporated into a project to minimize or avoid effects to endangered or threatened species. PDC typically include seasonal restrictions.

Should new information arise that significantly changes impacts to listed threatened or endangered species, the SW Oregon administrative units retain discretion to halt and modify all projects, anywhere in the process. Modifications could include an appropriate seasonal restriction; clumping of retention trees around the nest trees, establishment of buffers, dropping the unit(s)/portions, or dropping the entire project.

PDC may be waived at the discretion of the decision-maker, if necessary to protect public safety (as in the case of emergencies, that has an immediate potential to endanger human life). The Service will be notified of all such occurrences to determine if emergency consultation is

required and to adjust environmental baselines if necessary. The SW Oregon administrative units will be prudent in evaluating public safety deviations. They will attempt to predict potential problems (such as road failures) such that remedies can occur during times and using methods that minimize impacts to the extent possible. In the event emergency consultation is initiated, the SW Oregon administrative units will act prudently and efficiently to complete or close consultation in a timely manner, preferably within 6 months or less of the emergency action.

There are two types of PDC:

Mandatory: must be incorporated in all projects to reduce a likely to adverse affect determination (LAA) to listed species – these are required unless a specific exemption is mentioned in a “recommended” PDC.

Mandatory PDC are incorporated in all appropriate planned actions. The effects determination reflects their implementation. Projects unable to incorporate mandatory PDC will be analyzed under separate consultation.

Recommended: discretionary; incorporated in projects where appropriate to further reduce adverse affects (LAA). If the failure to implement a recommended PDC results in effects not previously considered, reinitiation of consultation would be required.

In some cases, application of PDC may reduce the impact of the projects to listed species and may change the effects determinations (from LAA to NLAA, or from LAA or NLAA to NE). In all cases, effects determinations for projects have been made using applicable PDC. The goal is to reduce the detrimental effects of any projects which “may affect” any endangered or threatened species. Some PDC apply to multiple species although most PDC apply to specific species. PDC are described by project type. The Plant PDC apply to all listed plants unless individual species are specifically mentioned.

This consultation effort updates some PDC that were used on projects covered by previous consultation efforts. These updated PDC will be incorporated into actions covered under previous consultations that have not yet been implemented, unless incorporating new PDC is not practical. In those cases, PDC in place under the previous consultation will apply.

The PDC in this consultation will be incorporated into those projects that will be implemented in FY04-08. “Sell date” is considered to be “implementation date” (sales which were “sold but not awarded” in FY01/02/03 **are** covered by biological opinion 1-7-01-F-032). Any timber sale scheduled to “sell” in FY 03 which actually “sells” after 30 September 03, will be covered in the FY04-08 Opinion, not the FY01-03 biological opinion.

In addition to the descriptions of the types of activities proposed by the SW Oregon administrative units, the Opinion includes mandatory and recommended project design criteria (PDC) which are measures designed to minimize the impacts to the species discussed in this Opinion. The mandatory PDC are required, except where noted, in order to be covered by this Opinion. The mandatory and recommended PDC are considered part of the proposed action and are reprinted in Appendix A.

The BLM Oregon State Office and Forest Service Regional Office (Region 6) have reviewed and approved this proposed action as being consistent with the NWFP implementation expectation

that “Approximately two and one-half percent of the extant amount of spotted owl habitat likely will be harvested per decade” (NWFP ROD pg 46). All acres of spotted owl habitat identified in this Opinion to be downgraded or removed will be subtracted from the habitat baseline unless the baseline is formally adjusted by the SW Oregon administrative units in conjunction with the Service at a later date.

All timber sale contracts will contain special provisions E-4 (BLM) or C6.25 (FS). These are standard contract provisions which require purchasers to discontinue operations upon receiving written notice from the BLM or FS that listed species may be affected by the action to an extent greater than anticipated. For example, if a previously undetected spotted owl nest were discovered in an active timber sale unit during the breeding season, the harvest operation would need to be halted. Consultation or reinitiation of consultation may be required prior to resumption of operations.

The Forest Service and BLM will reinitiate consultation if activities exceed the effects outlined in this document. Reinitiation of consultation must occur if acres of proposed harvest or projects that would result in adverse effects to listed species or critical habitat differ from this analyses or are exceeded by Resource Area or Ranger District, Land Use Allocation, CHU or Section 7 watershed. In addition, reinitiation must also occur if total acres of harvest types are exceeded, such as, total acres or habitat removal exceeds what has been analyzed in this Opinion.

III. Status of the Species

Spotted Owl

Legal Status

The spotted owl was listed as threatened on June 26, 1990. It was listed due to widespread habitat loss across the entirety of its range and the inadequacy of existing regulatory mechanisms to provide for its conservation (USDI Fish and Wildlife Service 1990a). Critical Habitat for the spotted owl was designated on January 15, 1992 (USDI Fish and Wildlife Service 1992a).

Life History

The spotted owl, one of three subspecies of spotted owls currently recognized by the American Ornithologists’ Union, is typically associated with old-growth forested habitats throughout the Pacific Northwest. A more detailed account of the taxonomy, ecology, and reproductive characteristics of the spotted owl is found in the 1987 and 1990 U.S. Fish and Wildlife Service Status Reviews (USDI Fish and Wildlife Service 1987, USDI Fish and Wildlife Service 1990b); the 1989 Status Review Supplement (USDI Fish and Wildlife Service 1989); the Interagency Scientific Committee (ISC) Report (Thomas et al. 1990); the FEMAT Report (FEMAT 1993); and the final rule designating the spotted owl as a threatened species (USDI Fish and Wildlife Service 1990a).

Current and Historical Range

The current range and distribution of the spotted owl extends from southern British Columbia through western Washington, Oregon, and California as far south as Marin County (USDI Fish

and Wildlife Service 1990a). The southeastern boundary of its range is the Pit River area of Shasta County, California. Although the current range of the spotted owl is similar to the historical range where forested habitat still exists, the owl has been extirpated or is uncommon in certain areas. Past and ongoing timber harvest activities have eliminated, reduced or fragmented spotted owl habitat sufficiently to decrease overall population densities across the range. Owl occupancy is rarer throughout northern Washington, southern British Columbia, and northeastern California.

Habitat

Spotted owls rely on older forested habitats because they contain the structures and characteristics required for nesting, roosting, foraging, and dispersal. These characteristics include the following: a multilayered, multi-species canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities and other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for owls to fly (Thomas et al. 1990, USDI Fish and Wildlife Service 1990a). Forested stands with high canopy closure also provide thermal cover as well as protection from predation. In some ecotypes, recent landscape-level analyses suggest that a mosaic of late-successional habitat interspersed with other vegetation types may benefit spotted owls more than large, homogeneous expanses of older forests (Franklin et al. 2000, Meyer et al. 1998).

Reproductive Biology

The spotted owl is a relatively long-lived bird (average life span approximating 8 years) with a naturally low reproductive rate. Spotted owls do not reach sexual maturity until after 2 years; once an adult, females lay an average of 2 eggs per clutch (range 1-4 eggs). Nest sites are usually located within stands of old-growth and late-successional forest dominated by Douglas-fir, and consist of existing structures such as cavities, broken tree tops, or mistletoe (*Arceuthobium* spp.) brooms (Forsman et al. 1984, Blakesley et al. 1992, LaHaye and Gutierrez 1999). In general, courtship and nesting behavior begins in February to March with nesting occurring from March to June; however timing of nesting and fledging varies with latitude and elevation (Forsman et al. 1984). After the young fledge from the nest, they are still dependent on their parents until they are able to fly and hunt on their own. Parental care continues post-fledging into September (USDI Fish and Wildlife Service 1990b), and sometimes into October (Forsman et al. 1984). During this time the adults may not roost with the young during the day, but they will respond to begging vocalizations by bringing food to the young (Forsman et al. 1984).

Dispersal Biology

Natal dispersal of spotted owls from Oregon and Washington typically begins from mid to late September, and is remarkably synchronous across broad areas (Forsman et al. 2002). When data from many dispersing spotted owls is pooled, the direction of dispersal away from the natal site appears to be random (Miller 1989, Ganey et al. 1998, Forsman et al. 2002). Dispersal direction from individual territories, however, may be non-random in response to the local distribution of habitat and topography (Forsman et al. 2002). Natal dispersal appears to occur in stages, with juvenile spotted owls settling in temporary home ranges between bouts of dispersal (Forsman et

al. 2002). Median natal dispersal distance is about 10 miles for males and 15.5 miles for females (Forsman et al. 2002, see also Miller 1989, Ganey et al. 1998). Successful dispersal of juvenile spotted owls may depend on their ability to locate unoccupied suitable habitat in close proximity to other occupied sites (Lahaye et al. 2001).

Breeding dispersal occurs among a small proportion of adult spotted owls, and these movements were more frequent among females and individuals that were unmated or lost their mate from the previous year (Forsman et al. 2002). Breeding dispersal distances were shorter than natal dispersal distances and also appear to be random in direction (Forsman et al. 2002).

Large non-forested valleys are apparent barriers to natal and breeding dispersal, with forested foothills between valleys providing the only opportunities for dispersal (Forsman et al. 2002). The degree to which water bodies, such as the Columbia River and Puget Sound, are barriers to dispersal is unclear. Analysis of genetic structure of spotted owl populations suggests that high rates of gene flow may occur between the Olympic Mountains and Washington Cascades (across the Puget Trough) and between the Olympic Mountains and the Coast Range of Oregon (across the Columbia River) (Haig et al. 2001). Both telemetry and genetic studies indicate inbreeding is rare.

Dispersing juvenile spotted owls experience high mortality rates, exceeding 70 percent in some studies (USDI Fish and Wildlife Service 1990b, Miller 1989). Leading known causes of mortality are starvation, predation, and accidents (Miller 1989, USDI Fish and Wildlife Service 1990b, Forsman et al. 2002). Parasitic infection may contribute to these causes of mortality (Forsman et al. 2002). Additional information about the types of habitats used by spotted owls dispersing from their natal territories is needed to enhance conservation efforts for this life stage that experiences the highest mortality rate.

Food Habits

Composition of prey in the spotted owl's diet varies geographically and by forest type. Generally, flying squirrels (*Glaucomys sabrinus*) and red tree voles (*Arborimus longicaudus*) are more prominent prey items for spotted owls in Douglas-fir and western hemlock forests (Forsman et al. 1984), whereas dusky-footed woodrats (*Neotoma fuscipes*) dominate the diet in the Oregon and California Klamath provinces (Forsman et al. 1984, Ward et al. 1998). Depending on location, other prey species (i.e., mice, birds, and insects) also comprise a small portion of the spotted owl diet (Forsman et al. 1984). Mostly nocturnal, Delaney et al. (1997) found that prey delivery rates in Mexican spotted owls are highest during the hours just prior to dawn and following dusk. Stand vertical diversity and snag density and volume have been positively correlated with owl foraging intensity, likely because they influence local prey abundance (North et al. 1999).

Home Range

Spotted owl home range size varies by physiographic province and generally increases from south to north, which is likely in response to decreasing habitat quality (USDI Fish and Wildlife Service 1990a). Based on available radio-telemetry data (Solis 1983, Sisco and Gutierrez 1984, Paton et al. 1990, as summarized in Thomas et al. 1990), the Service estimated median annual home range size for the spotted owl by physiographic province throughout the range of the owl.

Because the actual configuration of the home range is rarely known, the estimated home range of an owl pair is represented by a circle centered upon an owl activity center, with an area approximating the provincial median annual home range. The Service uses a 0.7 mile radius circle to delineate the area most heavily used by spotted owls during the nesting season. Bingham and Noon (1997) found that spotted owls in northern California focused their activities in heavily-used “core areas” that ranged in size from about 167 to 454 acres, with a mean of about 409 acres; approximately half the area of the 0.7-mile radius circle.

Although differences exist in the natural stand characteristics that influence provincial home range size, habitat loss and forest fragmentation caused by timber harvest effectively reduce home range habitat quality. Data indicate that a reduction in the amount of suitable habitat reduces spotted owl abundance and nesting success (Bart and Forsman 1992, Bart 1995).

Population Dynamics

The spotted owl embodies a life-history strategy typically referred to as “K-selected”: it is a relatively long-lived organism, produces fewer and larger young, invests significantly in parental care, experiences later or delayed maturity, and exhibits high adult survivorship (Begon and Mortimer 1986). The life-history pattern of spotted owls appears to be one in which a long reproductive life span allows for some eventual recruitment of offspring even if recruitment does not occur each year (Franklin et al. 2000).

Annual variation in population parameters for spotted owls has been linked to environmental influences at various life history stages (Franklin et al. 2000). In coniferous forests, mean fledgling production has been higher when minimum spring temperatures were higher (North et al. 2000), a relationship that may be a function of increased prey availability. Across their range, spotted owls show a pattern of alternating years of high and low reproduction, with highest reproduction occurring during even-numbered years (e.g., Franklin et al. 1999). Although variation in prey availability has been suggested as a mechanism driving this pattern, the spatial scale and consistency of this pattern suggests other factors are involved. More information is needed about the links between habitat conditions and fitness of spotted owls.

Longitudinal studies on population dynamics of spotted owls suggest that spotted owl populations are regulated (i.e., rates of population change vary within consistent bounds around a mean value of $\Lambda = 1$) (Franklin et al. 2000). Potential regulating mechanisms include density-dependent (habitat quality, habitat abundance) and density-independent (climate) factors, as well as interactions among factors. Franklin et al. (2000) propose that as habitat quality decreases, density-independent factors may have more influence on variation in λ , which tends to increase variation in λ . A consequence of this pattern is that at some point, lower habitat quality may cause the population to be unregulated and decline to extinction (Franklin et al. 2000).

Threats

Reasons for Listing

The draft recovery plan for the northern spotted owl (USDI Fish and Wildlife Service 1992c) identified significant threats to the owl by physiographic province. These threats are

summarized as follows: low populations, overall population decline, limited habitat, declining habitat, distribution of habitat or populations, isolation of provinces, predation and competition, lack of coordinated conservation measures, and vulnerability to natural disturbance.

Threats were characterized for each province as severe, moderate, low, or unknown. In general, declining habitat was recognized as a severe or moderate threat to the spotted owl in all 12 provinces, isolation of provinces within 11 of 12 provinces, and declining populations in 10 of 12 provinces. Vulnerability to natural disturbances was rated as low within 5 of 12 provinces, indicating that habitat loss due to fire, windthrow, insects, or diseases was less of a concern from a range-wide perspective. The degree to which predation and competition might be threatening the spotted owl was unknown in more provinces than any of the other threats, suggesting that further investigation was warranted.

New Threats

Fire

Past fire suppression efforts and other land management actions have resulted in vast forested areas susceptible to large-scale, stand-replacing fires. These events could reduce and possibly eliminate owl habitat from extensive areas. Although the reserve network established by the Northwest Forest Plan (NWFP), the current conservation strategy for the spotted owl, was designed to buffer against catastrophic loss of habitat, the scale and intensity of recent fires suggest that federal forested lands are vulnerable to catastrophic fire. Forest management strategies designed to reduce these fire risks may adversely affect spotted owls. However, resultant benefits to the long-term survival of the species may be a more appropriate yard-stick against which to measure the owl conservation merits of particular forestry practices, such as fuels reduction activities.

Competition and Predation

The recent range expansion of barred owls into the Pacific Northwest (Taylor and Forsman 1976, Dunbar et al. 1991) may pose a significant competitive threat to spotted owls. Barred owls are larger than spotted owls, are aggressive toward them (Leskiw and Gutiérrez 1998), may compete with them for prey (Hamer et al. 2001), and the presence of barred owls apparently increases the chance that spotted owl sites will become unoccupied by spotted owls (Kelly 2001, Pearson and Livezey in review). Barred owls not only use old-growth forests (Hamer et al 1988, Dunbar et al. 1991, Dark et al. 1998, Herter and Hicks 2000, Pearson and Livezey in review), but they also use very fragmented, second-growth stands in areas throughout Washington and Oregon outside of the range of the northern spotted owl (Csuti *et al.* 1997). Therefore, in areas where timber harvest has modified spotted owl habitat, barred owls may have a competitive advantage over spotted owls (Dark et al. 1998), which prefer structurally complex older forests for nesting and roosting (Forsman et al. 1984, Bart and Forsman 1992, Hunter et al. 1995, Swindle et al. 1999). Consequently, the degree to which barred owls affect the conservation and recovery of the spotted owl needs to be considered.

Currently there is little empirical data confirming that habitat fragmentation contributes to increased levels of predation on spotted owls. However, great horned owls, an effective predator

on spotted owls, are closely associated with fragmented forest, openings, and clearcuts (Craighead and Craighead 1956, Johnson 1992, Laidig and Dobkin 1995). As mature forests are harvested, great horned owls may colonize the fragmented forest, thereby increasing spotted owl vulnerability to predation. Habitat fragmentation may also encourage encroachment of barred owls, an apparent competitor of the spotted owl. Due to their more varied use of prey (Hamer et al. 2001), barred owls are much more “generalists” in their habitat requirements and require smaller home ranges (Hamer 1988). When sympatric with spotted owls, barred owl sites in some areas have less mature coniferous forest than spotted owl sites (Herter and Hicks 2000). Consequently, timber harvest that reduces the amount of older forest may give barred owls a competitive edge.

Changes in Silvicultural Practices

Timber harvest methods can be grouped into two primary types: regeneration harvest and density management. Regeneration harvest includes green tree retention, group selection, shelterwood, and clearcut silvicultural systems. These harvest systems conform to typical NWFP retention guidance, such as retain 15 percent of each harvest unit (Forest Service) or 6 to 8 green legacy trees per acre (BLM). In contrast, density management or commercial thinning is highly variable in the number of leave trees and canopy closure retained after harvest. The primary goal of density management is to leave healthy trees with enough space and resources to continue to grow at a maximum rate. For most site types, maximized growth rates equate to harvested stands with a canopy closure in the range of 40 to 60 percent and a basal area between 80 and 140 square feet per acre. This results in leaving a large percentage of timber volume standing on harvest units. Harvest systems using density management techniques require three to five times the number of acres to get the equivalent timber volume yielded by regeneration harvest systems (Frank Bettlejewski pers. comm.).

Probable Sales Quantity (PSQ) was calculated for the NWFP using methods that assumed specified proportions of yield would come from regeneration harvest and density management (Johnson et al 1993). These assumptions were used in turn to estimate the number of acres by harvest system and volume that was expected during the first decade of the NWFP by National Forest and BLM District. Subsequent to completion of these estimates, the use of density management has expanded throughout the NWFP area. This shift in harvest techniques in many areas reflects an effort to reduce catastrophic wildfire hazards and to promote individual tree vigor. Density management prescriptions are also more acceptable to the general public, they can be applied to scenic and riparian areas, and they can be used in harsh conditions where conventional regeneration harvest will impede new stand establishment and growth. As the shift from regeneration harvest to density management proceeds, the total number of acres impacted by timber harvest increases.

Density management harvest systems can result in retention of less down wood and snags of a smaller size due to modification of NWFP guidelines for these features allowed with the use density management (partial harvest) prescriptions. Prescriptions for density management also tend to remove diseased and deformed trees, such as trees infested with mistletoe, which would provide future snags and down wood and provide some canopy diversity. These consequences of density management can reduce the quality of habitat for spotted owls and their prey.

Density management is generally considered less of an impact on spotted owls than regeneration harvest. The impacts are considered short-term (20 to 30 years), meaning that the stands should be accelerated toward late-successional condition by the thinning and should be functional within this time frame. However, although the condition of these stands after harvest is often conducive to tree growth, it does not promote the full array of late successional forest structures and processes. Thus, density-managed stands may have larger trees and high canopy closure, but they tend to lack snags, down wood, deformed or diseased trees, and canopy layering.

Probable effects to spotted owls resulting from an increase in density management acres will vary by vegetation type and silvicultural prescriptions. In general, density management will reduce habitat quality on more acres than projected in the NWFP, but these effects on habitat quality will be less severe than effects resulting from regeneration harvest of equivalent timber volumes. After density management, stands are unlikely to function as nesting or roosting habitat due to reduced canopy closure and removal of diseased or deformed trees. Similarly, foraging habitat quality is likely to be reduced by snag removal and simplification of vertical structure. High-use spotted owl foraging habitat is typically characterized by a high density of large snags and a diverse canopy structure that provide habitat for prey species as well as hunting perches for owls (North et al. 1999). In some cases, density management may result in stands that are open enough to encourage use by predators of spotted owls, such as great horned owls (*Bubo virginianus*), thus reducing dispersal habitat quality.

The NWFP assumed that the Matrix would contribute suitable habitat for spotted owls in the short term as suitable habitat develops in established LSRs that are intended to support owl population clusters. Removal and degradation of spotted owl habitat in the Matrix may occur at higher rates than assumed in the NWFP because increasing use of density management affects more acres to meet the projected PSQ. If the PSQ is not adjusted, density management may also lead to more rapid re-entry of stands. This management pattern could produce stands that will never recover spotted owl habitat attributes after the first entry and eventual conversion to young stands with legacy trees; i.e., density management may result in a similar outcome for habitat as regeneration harvest, but arrive there via a pathway and schedule that both accelerate and obscures declines in habitat quality. Additional information is needed on specific density management prescriptions that retain habitat quality for spotted owls.

West Nile Virus.

West Nile virus is a mosquito-borne pathogen that causes encephalitis in humans, horses, and birds. From its point of introduction on the east coast of the United States, the virus has spread rapidly to the south and west, and has recently been reported from the range of the spotted owl in Washington and California (CDC 2003). Different species of birds show wide variation in mortality rate and competence in response to experimental infection with West Nile virus (Komar et al. 2003). Most infected birds survive and develop life-long immunity (CDC 2003). Passerine birds in general, and corvids in particular, are most severely affected (Komar et al. 2003), and infection has contributed to significant declines in corvid populations (Royle et al. 2002). West Nile virus has recently been identified as a source of mortality in raptors as well

(Roylance 2002). Exposure to St. Louis encephalitis may provide some cross-immunity to West Nile virus (Tesh 2003), but prevalence of St. Louis encephalitis in spotted owls is unknown. Mortalities due to West Nile virus have been reported from seven owl species native to North America, including barred owls (*Strix varia*) (CDC 2003), but at present this list does not include spotted owls. In experimental infections, great horned owls were found to be susceptible to infection through exposure to infected prey species (Komar et al. 2003). Great horned owls were also moderately competent reservoirs for West Nile virus, developing a moderate viremia for a moderate time period (Komar et al. 2003). No epidemiological information about seroprevalence or mortality rates in owls is currently available.

The limited available information summarized here suggests that spotted owls are likely to be susceptible to West Nile virus, but the consequences of infection are currently unknown. Likewise, impacts on spotted owls from mosquito control efforts, including both disturbance from application procedures and chemical contamination from increased pesticide use, are also unknown. The impacts of vector control efforts on spotted owls are not expected to be large because spotted owls typically are not found in close proximity to human habitation or the wetland environments typically treated to control mosquitoes.

Other Factors.

Based upon a global meta-analysis, Parmesan and Yohe (2003) discussed several potential implications of global climate change to biological systems, including terrestrial flora and fauna. Results indicated that 62 percent of species exhibited trends indicative of advancement of spring conditions. In bird species, trends were manifested in earlier nesting activities. Because the spotted owl exhibits a limited tolerance to heat in comparison to other bird species (Weathers et al. 2001), subtle changes in climate have the potential to affect this species. Further, increasing temperatures may increase the competitive advantage of phenotypes more tolerant or adapted to warmer conditions. Haig et al. (2001) indicated that northern and California spotted owls may be interbreeding in the area where their ranges overlap. The question as to whether such introgression is different from what would normally be expected between closely related subspecies, or is increasing due to changing environmental conditions, such as climate, warrants further investigation.

Conservation Needs of the Spotted Owl

Based upon the primary threats to the spotted owl over the majority of its range at the time of listing, the conservation needs of the owl revolve around the following biological principles: 1) the presence of large blocks of habitat to support clusters or local population centers of owls (e.g., 15 to 20 breeding pairs), 2) habitat conditions and spacing between local populations of owls to facilitate survival and movement, and 3) managing habitat across a variety of ecological conditions within the owl's range to reduce risk of local or widespread extirpation (USDI Fish and Wildlife Service 1992c).

Conservation Strategy

Since listing, various efforts have addressed the conservation needs of the species, and attempted to formulate conservation strategies based upon these needs. These efforts began with the ISC's

Conservation Strategy (Thomas et al. 1990), continued with the designation of Critical Habitat (USDI Fish and Wildlife Service 1992a), the Draft Recovery Plan (USDI Fish and Wildlife Service 1992c), and the Scientific Advisory Team report (FEMAT 1993), and culminated with the NWFP (USDA Forest Service and USDI Bureau of Land Management 1994a). Each conservation strategy was based upon the reserve design principles first articulated in the ISC's report, which are summarized as follows:

1. Species that are well distributed across their range are less prone to extinction than species confined to small portions of their range;
2. Large blocks of habitat, containing multiple pairs of the species, are superior to small blocks of habitat with only one to a few pairs;
3. Blocks of habitat that are close together are better than blocks far apart;
4. Habitat that occurs in less fragmented (that is, contiguous) blocks is better than habitat that is more fragmented; and
5. Habitat between blocks is more effective as dispersal habitat if it resembles suitable habitat.

Federal Contribution to Recovery

The NWFP is the current conservation strategy for the spotted owl on federal lands. It is designed around the conservation needs of the owl and based upon the designation of a variety of land-use allocations whose objectives are either to provide for population clusters (i.e., demographic support) or to maintain connectivity between population clusters. The land-use allocations that are intended to contribute primarily to supporting population clusters include the following: LSRs; Managed Late Successional Areas (MSLAs); Congressionally Reserved Areas (CRAs); and Managed Pair Areas and Reserve Pair Areas. The remaining land-use allocations [Matrix, AMAs, RRs, Connectivity Blocks, and Administratively Withdrawn Areas (AWAs)] were to provide habitat connectivity between the habitat blocks.

The range-wide system of LSRs set up under the NWFP captures the variety of ecological conditions within the 12 different physiographic provinces to which spotted owls are adapted. This design reduces the potential for loss of the entire population due to large catastrophic events in a single province. Multiple, large LSRs in each province reduce the potential that spotted owls will be lost in any individual province and reduce the potential that large wildfires or other events will eliminate all habitat within a LSR. In addition, LSRs are generally arranged and spaced so that spotted owls may disperse to two or more adjacent LSRs. This network of reserves reduces the likelihood that catastrophic events will impact the habitat connectivity and population dynamics within and between provinces. Although FEMAT scientists predicted that spotted owl populations would decline in the Matrix over time, populations were expected to stabilize and eventually increase within LSRs as habitat conditions improve over the next 50 to 100 years (FEMAT 1993, USDA Forest Service and USDI Bureau of Land Management 1994a and 1994b). The NWFP included standards and guidelines (S & Gs) for managing all agency

actions, and provided for an annual timber harvest program that would be consistent with the conservation principles of the NWFP (USDA Forest Service and USDI Bureau of Land Management 1994a and 1994b).

In 1994, the Service issued a biological opinion on the NWFP that assessed the effects of adopting this comprehensive management plan on Federal lands. The Service concluded that the NWFP would provide for a stable and self-sustaining spotted owl population on Federal lands and, on that basis, would constitute the Federal contribution to spotted owl recovery (USDA Forest Service and USDI Bureau of Land Management 1994a). This conclusion was based on the assumption that the provinces would provide the building blocks for conserving this species. As such, the Service concluded that if the NWFP was implemented as the FEMAT scientists intended, it would provide the basis for evaluating actions under the section 7 of the Act. It should be noted that the current conservation strategy provided by the NWFP does not necessarily take into consideration the potential new threats to spotted owls that have been identified since listing and development of NWFP.

Conservation Efforts on Non-federal Lands

FEMAT noted that limited federal ownership in some areas constrained the ability to form an extensive reserve network to meet spotted owl conservation needs. Thus, non-Federal lands were an important contribution to the range-wide goal of achieving conservation and recovery of the spotted owl. The Service proposed a special rule for non-Federal lands in 1995, it was never finalized. Consequently, the primary non-Federal action taken toward furthering spotted owl conservation involves development of habitat conservation plans (HCPs) or provision of sufficient habitat around existing owl pairs to avoid take (as defined by the Act) of those owls.

Current Condition

The current condition of the species incorporates the effects of all past human and natural activities or events that have led to the present-day status of the species (USDI Fish and Wildlife and USDC National Marine Fisheries Service 1998). Baseline conditions for the owl were evaluated to some degree during the process of formulating the NWFP through qualitative and quantitative analyses of various measures such as habitat availability, distribution, and condition. The following section reports on changes that have occurred to those baseline conditions since 1994, relying particularly on data and information provided in Service consultations conducted pursuant to section 7 of the Act, and various other technical assistance documents.

Rangewide: Habitat and Population Trends

Since 1994, the Service has consulted on many actions associated with implementation of the NWFP and other Federal and non-federal activities that may affect the spotted owl or its Critical Habitat. The geographic scale of these consultations has varied from individual timber sales or HCPs to multiple actions covering multiple administrative units, depending on the scope of the proposed Federal action. In general, the effects of these consultations were assessed in light of the reserve or connectivity goals established by the NWFP land-use allocations (USDA Forest

Service and USDI Bureau of Land Management 1994a), and expressed in terms of changes in suitable spotted owl habitat within those land-use allocations.

Habitat Trends

The Service has updated the environmental baseline for spotted owl habitat on several occasions since the owl was listed in 1990. Based on these assessments, habitat continues to decline on a range-wide basis. For example and perspective, about 7,397,098 acres of suitable habitat were estimated to exist on Federal lands in 1994 (Table 2). As of April 16, 2003, the Service has consulted on the removal of 587,158 acres of spotted owl habitat of which 183,600 occurred on federal lands managed under the NWFP (Table 2). This habitat loss was distributed throughout most of the NWFP physiographic provinces (except the Western Lowland and Willamette Valley provinces). Most individual provinces experienced no more than a 4 percent reduction in suitable habitat since 1994 (Table 3). However, within the Oregon Klamath Mountain province, habitat loss has been relatively high, compared to other provinces (about 8.5%), making up 37 percent of habitat loss rangewide. The majority of this habitat loss (98%) has been concentrated outside of reserves (i.e., LSRs, MLSAs, and CRAs). Consequently, the Service concludes that the amount of suitable habitat available within LSRs has not changed significantly from when the Record of Decision (ROD) for the NWFP was signed and that spotted owl movements between LSRs and between adjacent physiographic provinces are still likely despite the disproportional amount of timber harvest in this area (USDI Fish and Wildlife Service 2001b). Reasons for the comparatively large number of acres of habitat consulted on for removal in the Oregon Klamath Mountain province include a higher percentage of Matrix acres and a shift to density management harvest which can impact up to three times as many acres as a regeneration harvest for the timber volume removed.

In 2002, the Biscuit Fire in southwest Oregon and northern California burned almost 500,000 acres, primarily on the Siskiyou National Forest. The fire and the associated response resulted in a loss of approximately 95,500 acres of spotted owl habitat, including habitat loss within five LSRs. In the Service's 2001 biological opinion (USDI Fish and Wildlife Service 2001), the Service analyzed the amount and distribution of the Rogue Basin's spotted owl dispersal habitat (based on agency habitat data) and found that dispersal habitat existed in most areas except in the location of this fire. This analysis also highlighted that the smaller LSRs in this area had very little suitable or dispersal habitat within them, and that they were unlikely to support large clusters of reproducing spotted owls. Although one large LSR (Fishhook) was heavily impacted by the Biscuit fire, the distribution of areas affected by loss of suitable habitat would not likely preclude movement of spotted owls between the Coast and Cascade provinces.

Range-wide, consulted-on effects from 1994 to April 16, 2003 (Table 4) are consistent with the assumptions for the first decade of the NWFP as discussed in the Service's 1994 biological opinion (USDI Fish and Wildlife Service 1994). The amount of suitable habitat removed due to timber harvest in the first decade did not exceed the level (196,000 acres) predicted under the NWFP. Most harvest was concentrated outside the Reserves intended to provide for population clusters of owls.

Between April 16 and August 12, 2003, an additional 2,218 acres of spotted owl habitat have been lost, all of which were removed or downgraded as a result of agency actions on land managed by the Forest Service, the BLM, and the Bureau of Indian Affairs. Five different physiographic provinces have been affected: the Olympic Peninsula, the western Washington Cascades, the eastern Oregon Cascades, the California Coast, and the California Klamath provinces. Of these habitat effects, 1,707 acres were attributed to timber harvest activities, resulting in an aggregated total of 162,994 acres of suitable habitat removed from Northwest Forest Plan lands due to timber harvest since 1994.

Of the 2,218 acres of habitat that have been consulted on for removal, 287 acres have been from reserved land-use allocations, with 287 of these acres coming from the eastern Oregon Cascades province. This province has experienced significant shifts in forest type due to fire exclusion, resulting in an increase in dense white fir stands that are susceptible to large-scale forest fires. Stands in reserved and non-reserved allocations have been treated to drive the shift back to a more fire-evolved pine forest, particularly in the urban interface. The largest acreage impacts in any one province are also in the eastern Oregon Cascades province where a total of 1,647 acres of spotted owl habitat have been consulted on for removal/downgrading. Given the widespread nature of these consulted on acres and the relatively low numbers from a range-wide perspective, these additional acres that have been consulted on since April 16, 2003, are consistent with the assumptions for the first decade of the NWFP as discussed in the Service's 1994 biological opinion (USDI Fish and Wildlife Service 1994). That is, timber harvest in the first decade has not exceeded the 196,000 acres predicted under the NWFP, and most harvest has been concentrated outside the Reserves that are to provide for population clusters of owls.

Spotted Owl Numbers, Distribution, and Reproduction Trends

Spotted owls were located at approximately 4,600 sites (federal and non-federal lands) between 1987 and 1991. The status of these sites included 3,602 confirmed pairs and 957 territorial single spotted owls. Although a majority of the owl sites occurred on federal lands, a significant number also occurred on non-federal lands, particularly in northwestern California. The actual population of owls across the range is undoubtedly larger than the number of individuals confirmed at that time because a significant portion of the range of the spotted owl has yet to be surveyed (USDI Fish and Wildlife Service 1992c, Thomas et al. 1993).

To date, survey coverage of all suitable habitat is incomplete and effort has been sporadic, not systematic, and insufficient to produce reliable population estimates. Consequently, the Service has turned to other indices, such as demographic data, to evaluate the current condition of the spotted owl population. Analysis of demographic data can provide an estimate of the rate and direction of population growth.

Franklin et al. (1999) analyzed demographic data from 1985 through 1998 from 16 independent study areas located throughout the owl's range (4 in Washington, 9 in Oregon, and 3 in California). The study areas encompassed 20,500 square miles, representing about 23 percent of the owl's range. They consisted primarily of flands although some private lands, Tribal lands, and Oregon State lands were included. Overall, results indicated that although the owl

population is still declining; the decline is characterized by a slower rate than previously reported (Franklin et al. 1999). Thomas and Raphael (1993) predicted a population decline, but did not present a specific rate of decline. Therefore, conformance of observed declines with those anticipated cannot be determined.

The estimated range-wide λ for territorial females, adjusted for juvenile emigration, is 0.961, indicating an annual decline in territorial females of 3.9 percent from 1985 to 1998 (Franklin et al. 1999). Although this is less than the 4.5 percent rate of decline estimated for the years from 1986 through 1993 (Burnham et al. 1996), it is still significantly different from a stable population (Franklin et al. 1999). After accounting for juvenile emigration, 4 of 16 individual owl populations appear to be stable ($\lambda=1.0$), at least 8 have evidence to support a decline ($\lambda<1.0$), and the remainder are either stable or declining (Franklin et al. 1999). Mean estimates of apparent survival across all study areas increased with age. Survival rates of adult females across all study areas varied among years, but no longer exhibited the negative range-wide trend apparent in the 1993 analysis (Forsman and Anthony 1999). However, survival rates of female spotted owls in the three California studies continue to show a downward trend. Fecundity varied by year and by physiographic province. Across their range, owls continue to show alternating good and bad reproductive years. Owls found east of the crest of the Cascade Mountains exhibited higher fecundity and lower survival rates, compared to those found west of the crest.

Fewer than 20 pairs of spotted owls are known to exist in southwestern British Columbia in 1990 (Thomas et al. 1990). Current official information on the distribution and abundance of spotted owls in British Columbia is not available (British Columbia Ministry of Water, Land, and Air Protection website; www.elp.gov.bc.ca.sry). Unofficial estimates, however, suggest as many as 60 spotted owl activity centers may have existed in the early 1990s, but subsequent declines may have reduced current abundance to about 40 activity centers. Habitat loss continues to be the greatest threat to spotted owls in British Columbia; about 7,400 acres of spotted owl habitat continue to be removed annually within that portion of its range. This habitat removal is further fragmenting the spotted owl population.

The goal of the British Columbia Spotted Owl Management Plan, approved in May 1997, was to “provide a reasonable probability that spotted owl populations will stabilize, and possibly improve, over the long-term...” (British Columbia Ministry of Water, Land, and Air Protection website; www.elp.gov.bc.ca.sry/wlap/fwh/wildlife/srmz). The key components of the plan are as follows:

- Permanent protection of about 393,000 acres of potentially suitable spotted owl habitat.
- Designation of about 500,000 acres of Special Resource Management Zones that combine spotted owl management and forestry; in these areas, a minimum of 67 percent of spotted owl habitat will be maintained, patches of habitat greater than 1,200 acres will be retained and connected by corridors at least 0.61 mile in diameter, and 0.31 mile radius reserve zones around nests and roost sites will be protected.

- Designation of 8 temporary Matrix Activity Areas managed to maintain 67 percent suitable spotted owl habitat within 7,900 acre core areas; these areas will be phased out as habitat develops in the Special Resource Management Zones.

This plan is expected to result in a 60 percent chance of the spotted owl population stabilizing or possibly improving over the long-term. Although this plan may maintain dispersal opportunities, the relatively low estimate of total activity centers in British Columbia, and the modest estimated probability of population stabilization, suggests that British Columbia is unlikely to serve as an important source of spotted owls moving into the U.S. portion of the species' range.

Designated Critical Habitat for the Spotted Owl

Status of Designated Critical Habitat

Legal Status

The Act requires the Service to designate critical habitat to the maximum extent prudent and determinable when listing a species as threatened or endangered. Critical habitat consists of geographical areas essential to the recovery of a listed species. The Act defines conservation as procedures necessary to bring about the recovery of a listed species. Therefore, critical habitat has the dual function to provide for the survival and the recovery of a listed species (Rohlf 1989). Critical habitat is provided protection under section 7 of the Act by ensuring that activities funded, authorized, or carried out by federal agencies do not adversely modify such habitat to the point that it no longer aids in the recovery of the intended species. On January 15, 1992, the Service designated critical habitat for the spotted owl within 190 critical habitat units (CHUs) encompassing nearly 6.9 million acres across Washington (2.2 million), Oregon (3.2 million), and California (1.4 million) (USDI Fish and Wildlife Service 1992a).

Primary Constituent Elements

Primary constituent elements are environmental factors the Service determines are essential to a species' conservation. For the spotted owl the primary constituent elements of critical habitat have been identified as the physical and biological features that support nesting, roosting, foraging, and dispersal (USDI Fish and Wildlife Service 1992a).

Conservation Strategy and Objectives

A spotted owl critical habitat designation is based on the identification of large blocks of suitable habitat well distributed across the range of the spotted owl, and that contains the primary constituent elements. As such, designation of spotted owl critical habitat reflects the conservation principles emphasized by the ISC strategy (Thomas et al. 1990) of 1) providing large areas of suitable habitat to support population clusters, and 2) provide for dispersal between population clusters (USDI Fish and Wildlife Service 1992a). CHUs were intended to identify a network of habitats that provided the functions considered important to maintaining a stable, self-sustaining, and interconnected population over the spotted owl range with each CHU having a local, provincial, and a range-wide role in spotted owl conservation. Most CHUs were expected to provide suitable habitat for population support, while some were designated

primarily for connectivity (or both). Ultimately, CHUs were to provide for the recovery of the spotted owl.

The final rule designating critical habitat (USDI Fish and Wildlife Service 1992a) stated that “Analysis of impacts should consider provinces, subprovinces, and individual CHUs, as well as the entire range of the subspecies.” The rule also expressed the expectation that the physiographic province be the primary scale of analysis for evaluating project-related effects to critical habitat to determine if range-wide conservation goals are being met.

The Service’s approach to designated critical habitat was based on the expectation that a long-term plan would be developed to provide for conservation of the spotted owl. The final rule designating critical habitat stated that “Designation will help retain recovery options and reduce the near-term risk until a long-term conservation plan is implemented.” The rule also stated that “Designation of critical habitat does not offer specific direction for managing owl habitat. That type of direction will come ... through the development of land management plans that address management of the owl.”

The NWFP, which adopts coordinated management direction for federal lands within the range of the spotted owl, represents the only existing management plan that addresses conservation of the spotted owl on federal lands. The NWFP was developed using conservation principles similar to those used to designate critical habitat. Specifically, LSRs were designated to provide large blocks of suitable habitat capable of supporting multiple pairs of spotted owls. Connectivity between LSRs is provided by riparian reserves and other NWFP LUAs. As such, over 70 percent of suitable habitat in CHUs overlaps with NWFP LSRs. This led the Service to conclude in their biological opinion for Alternative 9 of the NWFP that the network of conservation lands (LSRs) designated under the NWFP “should enable critical habitat to perform the biological function for which it was designated”.

Despite the fact that there is extensive overlap between CHU and LSRs, CHUs are more evenly distributed across the landscape. Thus, connectivity may be the most important ongoing function of critical habitat. This would be particularly true in areas where the risk of habitat loss from wildfire is high.

Current Condition

Critical Habitat Range-wide

In 1994, the Final Supplemental Environmental Impact Statement (FSEIS) established the environmental baseline for spotted owl critical habitat on federal lands under NWFP management as 3,141,987 acres of suitable habitat (USDA Forest Service and USDI Bureau of Land Management 1994). Tracking changes to that environmental baseline is crucial for evaluating effects to spotted owl critical habitat. The following discussion reports on changes that have occurred to the baseline condition since implementation of the NWFP, relying specifically on Service consultations conducted pursuant to section 7 of the Act. The current condition of critical habitat is also influenced by natural events including wildfire, windthrow,

and insect and disease damage. Although realized and potential effects to critical habitat from natural disturbances will be discussed, adjustments to baseline figures will not be incorporated until official documentation of these effects are received from the SW Oregon administrative units.

Since the implementation of the NWFP, approximately 1.4 percent (43,842 acres) of extant suitable critical habitat has been consulted-on for removal or downgrading (Table 5) (USDI Fish and Wildlife Service 2003a). Consultation data indicate effects to critical habitat have not been evenly distributed throughout the range of the spotted owl and the majority of effects (approximately 99 percent) occurred in non-reserves (matrix and AMAs); land use allocations intended to provide connectivity among reserves. Reserves (LSRs), intended to provide large blocks of habitat to support clusters of breeding pairs, have remained relatively unaltered.

The majority of the consulted-on effects (approximately 69 percent totaling 30,067 acres) to suitable spotted owl critical habitat range-wide have occurred in the Oregon Klamath Mountains and Western Oregon Cascades physiographic provinces. Besides providing large blocks of suitable habitat to support population clusters and intra-provincial connectivity, these provinces also provide important inter-provincial links. The Oregon Klamath Mountains province provides a link between the Oregon Coast Range and Western Oregon Cascades provinces and south into the northern California provinces. The northern portion of the Western Oregon Cascades province provides the link to the Washington Cascades across the Columbia Gorge area of concern while the southern portion of this province shares the three linkage areas within the I-5 area of concern which connect this province with the Oregon Coast Range and Oregon Klamath Mountains provinces (USDI Fish and Wildlife Service 2001a).

Within the Oregon Klamath Mountains province, consulted-on effects have had a disproportionate impact to individual CHUs; six have not experienced any suitable habitat removal or downgrading, six have had less than five percent of their suitable habitat removed or downgraded, and three (OR-63, OR-64, and OR-75) have experienced a greater than 10 percent reduction in suitable habitat. Although the impact to nesting, roosting, and foraging habitat has been greatest within OR-63, OR-64, and OR-75, these units still provide ample amounts of suitable and dispersal quality habitat. Additionally, consulted-on effects within this province have been dispersed; none of the CHUs experiencing a greater than 10 percent reduction in suitable habitat are adjacent to each other. Therefore, it is anticipated that consulted-on effects have not precluded the CHUs in this province from meeting their intended functions (see USDI Fish and Wildlife Service 2001a, 2001c).

Twenty-eight of the 30 CHUs within the Western Oregon Cascades Province have been subjected to consulted-on effects. However, only seven (OR-11, OR-15, OR-22, OR-23, OR-24, OR-34, and OR-36) have had greater than 5 percent of suitable habitat removed or downgraded, of which, only three (OR-23, OR-24, and OR-36) have exceeded a 10 percent reduction in habitat. Although habitat quality within these CHUs has been reduced to some degree, due to the amount and distribution of remaining suitable habitat, the dispersed nature of effects, and the retention of dispersal habitat within CHUs OR-11, OR-15, OR-24, OR-34, and OR-36, it is anticipated that these CHUs are still functioning in their originally intended capacity (see USDI

Fish and Wildlife Service 2001a, 2001b). Critical habitat units OR-22 and OR-23, which were designated to provide “stepping stones” of suitable habitat within the South Willamette-North Umpqua portion of the I-5 area of concern, were not fully functional when designated due to limited amounts of suitable habitat (USDI Fish and Wildlife Service 2001a). The removal of suitable habitat from these units since 1994, will delay their ability to achieve their designated function. However, current management of these CHUs stresses the development and maintenance of connectivity in CHUs OR-22 and OR-23 (USDI Fish and Wildlife Service 2001a).

Notwithstanding that many of the CHUs in the Oregon Klamath Mountain and Western Oregon Cascades Provinces have been impacted to some degree and the majority of consulted-on effects have occurred in these provinces, total consulted-on effects in these provinces represents only 3.28 and 2.21 percent of their suitable critical habitat extant in 1994, respectively. Additionally, virtually all effects were to non-reserves, primarily matrix. The Service believes that these effects to connectivity are generally offset because of contributions to connectivity provided by other NWFP LUAs and Standard and Guidelines (i.e., the 15 percent LS/OG standard and guideline, survey and manage set-aside guidelines, and riparian reserves). Further, the effects to CHUs were dispersed within these provinces. Therefore, the Service believes consulted on effects to the Oregon Klamath Mountains and Western Oregon Cascades Provinces does not preclude these provinces from providing essential inter- and intra-provincial connectivity and providing suitable habitat to support population clusters.

Outside of the Oregon Klamath Mountain and Western Oregon Cascades Provinces, 13,775 acres of suitable habitat have been consulted-on for removal or downgrading from designated critical habitat range-wide since 1994. Over 97 percent of these effects occurred outside LSRs, generally in Matrix. These effects were dispersed over nine physiographic provinces and less than 2 percent of existing suitable critical habitat was removed from any individual province. The removal or downgrading of suitable critical habitat has occurred to varying degrees across the spotted owls range. However, since 1994, only a small percentage of extant critical habitat range-wide has been removed or downgraded, the majority of effects to critical habitat have occurred in the Matrix, and the critical habitat networks in all provinces appear to be functioning. Therefore, the Service concludes that consulted-on effects to critical habitat have not impaired its ability to provide for spotted owl conservation across the species range.

The impact of natural events also needs to be considered when evaluating the current condition of spotted owl critical habitat. Since its designation in 1992, numerous fires of different scale and intensity have occurred within CHUs. Critical habitat units were identified to provide large blocks of suitable habitat spatially distributed to provide for the survival and recovery of the spotted owl and to facilitate dispersal. The distribution framework of CHUs was intended to protect individual CHUs from isolation due to catastrophic natural events. However, the scale and intensity of recent fires, most significantly the Big Bar Complex in northern California and Biscuit fire in southwest Oregon, appear to have impacted the CHU framework.

The Big Bar Complex Fire, which included the Megram and Onion fires, burned approximately 140,000 acres in the summer and fall of 1999 (USDA Forest Service 2000). Burn severity maps indicate 31 percent of the Big Bar Complex burned at high fire severity while 54 percent and 12

percent of the fire burned at moderate and low severity, respectively (Jimerson and Jones 2000). This mixed fire regime (high, moderate, and low severity burn pattern) are characteristic of Coast Douglas-fir and Douglas-fir/hardwood plant communities (Arno 2000). High intensity fires are stand replacing fires that remove spotted owl habitat; whereas low intensity fires generally have little lasting effect to habitat. Habitat effects associated with moderate intensity fires are difficult to assess immediately following a fire and are better evaluated over longer time periods.

Fifty thousand of the acres burned in the Big Bar Complex Fire occurred in LSR 305 (Six Rivers National Forest website; www.fs.fed.us/r5/sixrivers). That LSR has a 93 percent overlap with CHU CA-30. Critical habitat unit CA-30 functions as an important link between the California Klamath and California Coast Range Provinces and is expected to provide habitat for 24 spotted owl pairs over time (USDI Fish and Wildlife Service 1991). Due to the extent of overlap with LSR 305 and the percent of overall acres that burned at high severity, it is reasonable to conclude that a substantial amount of suitable habitat was removed from CHU CA-30. However, CHU CA-30 is over 88,000 acres, of which, approximately 48 percent was suitable habitat before the Big Bar Complex fire. Thus, it is likely that the amount of suitable habitat remaining in this CHU permits it to function as intended. However, the effects to this CHU in areas of moderate fire severity should be evaluated over the next few years as habitat loss will become apparent as damaged trees die.

The Biscuit Fire, which began in July 2002, removed approximately 23,773 acres of suitable NSO habitat from five CHUs (OR-65, OR-68, OR-69, OR-70, and OR-71). CHUs most impacted by the Biscuit Fire were OR-68, OR-69, and OR-70. These units were identified for their important contribution to connectivity in areas where quality habitat were lacking and/or to ensure a range-wide distribution of spotted owls. CHU OR-68 lost approximately 35 percent (2,971 acres) of its available suitable habitat. That CHU provides a continuous band of nesting habitat between CHUs OR-69 and OR-67 and was established to ensure well distributed blocks of suitable habitat were maintained between these units (USDI Fish and Wildlife Service 1991). CHU OR-69, which lost approximately 76 percent (9,482 acres) of its available suitable habitat, is located in the area that provides the single link of critical habitat through the northwest portion of the Klamath Mountains Province leading to the Coast Range Province (USDI Fish and Wildlife Service 1991). Although not as important to inter-provincial connectivity, CHU OR-70 is a vital intra-provincial link, providing the only link for the north-south movement of spotted owls between OR-72 and OR-69 (USDI Fish and Wildlife Service 1991). The Biscuit Fire removed approximately 52 percent (9,157 acres) of suitable habitat from OR-70.

Due to the amount of habitat loss associated with the Biscuit Fire, the ability of CHUs OR-69, OR-70, and OR-71 to function as originally intended has been diminished to some degree. The amount of habitat lost in the Biscuit Fire also reduces the resilience of the above CHUs to future catastrophic events and increases the likelihood that additional effects could result in a loss of function. However, the amount and distribution of suitable and dispersal habitat currently existing within these CHUs should allow for movement of spotted owls through and between these CHUs (see USDA Forest Service and USDI Bureau of Land Management 2003) and important inter- and intra-provincial links provided by these CHUs should still be functioning. Other CHUs important to connectivity between the Klamath Mountains Province and the

Western Cascades and Coast Provinces (OR-62, OR-63, and OR-67) were not affected by the Biscuit Fire. Therefore, it is anticipated that the CHU network in southern Oregon continues to function as intended and is still fulfilling the conservation needs of the spotted owl in this part of the species range.

This evaluation of critical habitat indicates that effects since 1994 have impaired, to varying degrees, the ability of individual CHUs to fulfill their intended functions. However, these effects have not precluded the CHU network from providing for NSO conservation across the species range. The Service reached this conclusion based on the following reasons: (1) only 1.4 percent of designated critical habitat has been affected by consulted-on actions range-wide; (2) although the majority of consulted-on effects occurred in the Oregon Klamath Mountain and Western Oregon Cascades Provinces, the CHU network within these provinces continues to function; (3) notwithstanding that natural disturbances have resulted in the removal and degradation of large blocks of suitable habitat and reduced the resilience of the CHU network to future effects, they have not precluded the CHU network from functioning within any province; (4) the majority of consulted-on effects occurred in non-reserves, primarily in Matrix where effects to connectivity are expected to be offset by the contributions to dispersal of other NWFP LUAs and Standards and Guidelines; and (5) the approximately 70 percent overlap between LSRs and CHUs augments the ability of CHUs to provide suitable habitat for population support through LSR Standards and Guidelines designed to protect and enhance late-successional and old-growth forests.

Table 2. Changes to NRF¹ habitat (acres) from activities subject to Section 7 consultations and other causes; range-wide aggregate from 1994 to current range-wide update (*April 16, 2003*).

Ownership		Consulted-on Habitat Changes <u>2/</u>		Other Habitat Changes <u>3/</u>	
		Removed/ Downgraded	Degraded	Removed/ Downgraded	Degraded
Federal - NWFP	Bureau of Land Management	70,653	7,318	0	0
	Forest Service	96,888	418,846	0	0
	National Park Service	908	2,861	0	0
	Multi-agency	15,151	23,337	0	0
	NWFP Subtotal	183,600	453,362	0	0
Other Management and Conservation Plans (OMCP)	Bureau of Indian Affairs	97,200	20,850	0	0
	Habitat Conservation Plans	295,889	14,430	0	0
	OMCP Subtotal	393,089	35,280	0	0
Other Federal Agencies and Lands <u>4/</u>		154	1	0	0
Other Public and Private Lands <u>5/</u>		10,315	878	5,480	0
TOTALS		587,158	488,521	5,480	3,642

1/ Nesting, roosting, foraging habitat. Note that in California, suitable habitat is divided into two components; nesting – roosting (NR) habitat, and foraging (F) habitat. The NR component most closely resembles NRF in Oregon and Washington. Effects to NRF compiled in this and all subsequent tables include effects that occurred primarily to NR habitat in California.

2/ Includes both effects reported in USFWS 2001 and subsequent effects compiled in the Northern Spotted Owl Consultation Effects Tracker (web application and database).

3/ Includes effects to NRF (as documented through technical assistance) resulting from wildfires (not from suppression efforts), insect and disease outbreaks, and other natural causes, private timber harvest, and land exchanges not associated with consultation.

4/ Includes lands that are owned or managed by other federal agencies not included in the NWFP.

5/ Includes lands not covered by Habitat Conservation Plans that are owned or managed by states, counties, municipalities, and private entities. Effects that occurred on private lands from right-of-way permits across Forest Service and BLM lands are included here.

Table 3. Changes in NRF (acres) documented via section 7 consultation for all physiographic provinces throughout Northwest Forest Plan Lands; aggregate changes from 1994 to the current range-wide update (*April 16, 2003*).

Physiographic Provinces		Habitat removed/downgraded ^{4/}			Evaluation Baseline ^{3/}	% of Provincial Baseline Affected	% of Rangewide Effects
		Reserves ^{1/}	Non-Reserves ^{2/}	Total			
WA	Olympic Peninsula	55	24	79	560,217	0.0	0.0
	Western Lowlands	0	0	0	0	0	0
	W. Cascades	246	10,862	11,108	1,112,480	1.0	6.1
	E. Cascades	1,525	3,340	4,865	706,849	0.7	2.6
OR	Coast Range	279	3,954	4,233	516,577	0.8	2.3
	Willamette Valley	0	0	0	5,658	0	0
	Cascades W.	2,807	49,628	52,435	2,045,763	2.6	28.6
	Cascades E.	1,462	10,758	12,220	443,659	2.8	6.7
	Klamath Mountains	1,358	66,605	67,962	786,298	8.6	37.0
CA	Coast	181	64	245	51,494	0.5	0.1
	Klamath	1,470	23,775	25,245	1,079,866	2.3	13.8
	Cascades	0	5,200	5,200	88,237	5.9	2.8
TOTAL		9,390	174,210	183,600	7,397,108		

^{1/} Land-use allocations intended to provide large blocks of habitat to support clusters of breeding pairs.

^{2/} Land-use allocations intended to provide habitat to support movement of spotted owls among reserves.

^{3/} 1994 FSEIS baseline (USDA and USDI 1994).

^{4/} Includes both effects reported in USFWS 2001 and subsequent effects compiled in the Northern Spotted Owl Consultation Effects Tracker (web application and database).

Table 4. Changes to NRF (acres) on Northwest Forest Plan Lands; aggregate changes by land-use allocations from 1994 to current range-wide update (*April 16, 2003*).

	Reserves <u>1/</u>		Non-reserves <u>2/</u>			TOTALS
	<i>LSR/MLSA</i>	<i>CRA</i>	<i>AWA</i>	<i>AMA</i>	<i>Matrix</i>	
Evaluation Baseline <u>3/</u>	3,255,914	1,638,652	300,219	364,268	1,838,045	7,397,098
Removed/downgraded (timber harvest only) <u>4/</u>	6,951	18	334	14,491	139,360	161,154
Removed/Downgraded (all other programs) <u>5/</u>	1,513	908	54	458	19,513	22,446
Consultation Subtotal	8,464	926	388	14,949	158,873	183,600
Removed/downgraded by natural disturbance <u>6/</u>	0	0	0	0	0	0
Net change from land exchanges and transfers	0	0	0	0	0	0
Technical Assistance Subtotal	0	0	0	0	0	0
TOTAL	8,464	926	388	14,949	158,873	183,600
Baseline Balance <u>7/</u>	3,247,450	1,637,726	299,831	349,319	1,679,172	7,213,498
Total Habitat Degraded <u>8/</u>	20,631	2,861	410	9,335	419,125	452,362

1/ Land-use allocations intended to provide large blocks of habitat to support clusters of breeding pairs.

2/ Land-use allocations intended to provide habitat to support movement of spotted owls among reserves.

3/ 1994 FSEIS baseline (USDA and USDI 1994).

4/ Includes both effects reported in USFWS 2001 and subsequent effects compiled in the Northern Spotted Owl Consultation Effects Tracker (web application and database). Total effects from the timber sale program, presented in the right column, is the value to contrast with the expectation that NWFP implementation would result in removal of 196,000 acres of NRF per decade.

5/ Includes NRF effects from recreation, roads, minerals, and other non-timber programs of work.

6/ Includes effects to NRF resulting from wildfires (not from suppression efforts), insect and disease outbreaks, and other natural causes.

7/ Calculated as (evaluation baseline) – [(total consulted-on changes) + (removed/downgraded as documented through TA process)].

8/ Degraded habitat means that function remains the same, but quality is reduced.

Table 5. Changes in suitable critical habitat (acres) documented via section 7 consultation for all physiographic provinces throughout Northwest Forest Plan Lands; aggregate changes from 1994 to the current range-wide update (*August 5, 2003*).

Physiographic Provinces		Habitat removed/downgraded ^{4/}			Evaluation Baseline ^{3/}	% of Provincial Baseline Affected	% of Rangewide Effects
		Reserves ^{1/}	Non-Reserves ^{2/}	Total			
WA	Olympic Peninsula	8	59	67	197,009	0.03	0.15
	Western Lowlands	0	0	0	0	0.00	0.00
	W. Cascades	0	4,929	4,929	514,578	0.96	11.24
	E. Cascades	0	4,476	4,476	326,592	1.37	10.21
OR	Coast Range	15	1,209	1,224	348,717	0.35	2.79
	Willamette Valley	0	0	0	0	0.00	0.00
	Cascades W.	11	19,766	19,777	894,134	2.21	45.11
	Cascades E.	334	1,372	1,706	138,684	1.23	3.89
	Klamath Mountains	0	10,290	10,290	313,269	3.28	23.47
CA	Coast	0	43	43	2,616	1.64	0.10
	Klamath	0	965	965	355,701	0.27	2.20
	Cascades	0	165	165	50,687	0.33	0.38
TOTAL		368	43,474	43,842	3,141,987	1.40	100.00

^{1/} Land-use allocations intended to provide large blocks of habitat to support clusters of breeding pairs.
^{2/} Land-use allocations intended to provide habitat to support movement of spotted owls among reserves.
^{3/} 1994 FSEIS baseline (USDA Forest Service and USDI Bureau of Land Management 1994).
^{4/} Includes both effects reported in U. S. Fish and Wildlife Service 2001c and subsequent effects compiled in the Northern Spotted Owl Consultation Effects Tracker (web application and database).

Marbled Murrelet

Background

An account of the taxonomy, ecology, and reproductive characteristics of the marbled murrelet (murrelet) is found in the 1988 Status Review (Marshall 1988), the final rule designating the species as threatened (USDI 1992b), the final rule designating critical habitat for the species (USDI 1996), the Service's Biological Opinion for Alternative 9 (USDI 1994) of the FSEIS on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Spotted Owl (USDA and USDI 1994a), and the Recovery Plan for the Threatened Marbled Murrelet (USFWS 1997).

Introduction

The Marbled Murrelet Recovery Plan (USFWS 1997) for the murrelet refers to the NWFP as the backbone of the recovery effort for the murrelet. However, it strategically builds off the NWFP and considers non-federal lands and their role in recovery. The NWFP contributes to the recovery and conservation of the murrelet by providing large blocks of protected habitat in LSR land allocations within murrelet conservation zones along the Washington, Oregon, and California coasts. Furthermore, murrelet habitat is protected on federal land under the NWFP. No new timber sales will be planned in forested stands known to be occupied by murrelets regardless of whether these stands occur in LSRs, AMAs, or Matrix areas (USDA and USDI 1994b). Protocol surveys are required in suitable habitat to determine occupancy prior to actions that result in habitat loss. In addition, the system of LSRs will not only protect habitat currently suitable to murrelets, but also develop future habitat in larger blocks.

Recovery Threats

The recovery plan identified the primary threats to the species: 1) predation; 2) loss of nesting habitat; 3) by-catch in gill-nets, and; 4) oil pollution both chronic and from major spills. Predation and the amount and distribution of nest habitat are considered to be the most important determinants for species recovery.

Nest Tree Characteristics

Lank *et al.* 2003 states that murrelets “occur during the breeding season in near-shore waters along the north Pacific coastline from Bristol Bay in Alaska to central California”, using single platform trees generally within 20 miles and older forest stands generally within 50 miles of the coast for nesting. Unlike most auks, murrelets nest solitarily on mossy platforms of large branches in old-forest trees (Lank *et al.* 2003). Suitable habitat for murrelets may include contiguous forested areas with conditions that contain potential nesting structure. These forests are generally characterized by large trees greater than 18 inches dbh, multistoried canopies with moderate closure, sufficient limb size and substrate (moss, duff, etc.) to support nest cups, flight accessibility, and protective cover from ambient conditions and potential avian predators (Manley 1999, Burger 2002 and Nelson and Wilson 2002). Over 95% of measured nest limbs were ≥ 15 cm diameter, with limb diameter ranges from 7-74 cm diameter (Burger 2002).

Nelson and Wilson (2002) found that all 37 nest cups identified were in trees containing at least seven platforms. All trees were climbed, however, and ground-based estimates of platforms per tree in the study were not analyzed. Lank *et al.* (2003) emphasizes that murrelets do not select

tree species for nesting, but select individual trees containing suitable nest platforms. Nest cups have been found in deciduous trees, albeit rarely. Nest trees may be scattered or clumped throughout a forest stand.

Adjacent forest can contribute to the conservation of the murrelet by reducing potential for wind throw during storms by providing area buffers and creating a landscape with a higher probability of occupancy by murrelets (USDI 1996, Burger 2001, Meyer *et al.* 2002, Raphael *et al.* 2002, and Zharikov *et al.* submitted). Trees surrounding and within the vicinity of the potential nest tree(s) may provide protection to the nest platform and potentially reduce gradations in microclimate (Chen *et al.* 1993).

Nest Stand Characteristics

Nest stands are typically composed of low elevation conifer species. In California, nest sites have been located in stands containing old-growth redwood and Douglas-fir, while nests in Oregon and Washington have been located in stands dominated by Douglas-fir, western hemlock, and Sitka spruce. Murrelets appear to select forest stands greater than 50 ha (Burger 2002), but are found nesting in stands as small as one acre (Nelson and Wilson 2002). In surveys of mature or younger second-growth forests in California, murrelets were only found in these forests when there was nearby old-growth stands or where residual older trees remained (USDI 1992, and Singer *et al.* 1995).

At the stand level, vertical complexity was correlated with nest sites (Meekins and Hamer 1998, Manley 1999, Waterhouse *et al.* 2002, and Nelson and Wilson 2002), and flight accessibility has been postulated as a necessary component for suitable habitat (Burger 2002). Some studies have shown higher murrelet activity near stands of old-forest blocks over fragmented or unsuitable forest areas (Paton *et al.* 1992, Rodway *et al.* 1993, Burger 1995, Deschesne and Smith 1997, and Rodway and Regehr 2002), but this correlation may be confounded by ocean conditions, distance inland, elevation, survey bias and disproportionate available habitat. Nelson and Wilson (2002) found that potential nest platforms per acre were a strong correlate for nest stand selection by murrelets in Oregon.

Landscape Characteristics

Zharikov *et al.* (submitted) documents that murrelet nests were more often found within 30 meters of stand edges (hard and soft), closer to streams and farther from glaciers than would be expected if nests were placed randomly across the landscape. Murrelets preferred lower elevation habitat (below 600-700 meters elevation) than was available in the study areas (Huettmann *et al.* manuscript, and Zharikov *et al.* submitted). Lank *et al.* (2003) states, “Huettmann *et al.* (manuscript) found no relationship between breeding success and large-scale landscape features...”. “In contrast, for Desolation Sound, Zharikov *et al.* (submitted) reported that, compared to failed nests, nests successful to the mid-chick stage were initiated earlier in the season, were located closer to the edge of an area of subalpine vegetation, in a location with higher hard-edge clear-cut density, and at a higher elevation.” It is hypothesized that murrelets selected edges for flight access, that higher nest success was from lower corridor densities at higher elevations (away from supplemental feeding by human development and agriculture), that subalpine sites were on north-facing aspects which contain better moss production on limbs, and

that earlier nesting murrelets were older and more seasoned breeders able to take advantage of these factors from learned experience, rather than some genetic-induced fixed action pattern. Although large blocks of nesting habitat may attract increased murrelet activity due to the inherent increase in carrying capacity of nest platforms, fragmentation and patch size per se are very poor covariates when attempting to correlate habitat quality with landscape characteristics. Based on a sample of 16 nests, Nelson and Hamer (1995) found that nesting success of murrelets was lower if within 50 meters of a stand edge. Huettmann *et al.* (manuscript) found a bimodal distribution where murrelets preferentially selected for landscape patches that were <10 ha and >200 ha in size with no differences in nest success. Also, Zharikov *et al.* (submitted) found higher nest success closer (<30 m) to edges. Combined, all Canadian nest sample sizes were $n = 200$. Artificial nest depredation rates were found to be highest in western conifer forests where stand edges were close to human development (De Santo and Willson 2001 and Luginbuhl *et al.* 2001), and Bradley (2002) found increased corvid densities within 3 miles of urban interface due to supplemental feeding opportunities from anthropogenic activities. Golightly (in review) found extremely low reproductive success for murrelets nesting in large old-growth blocks of redwoods in the California Redwoods National and State Parks. Artificially high corvid densities from adjacent urbanization and park campgrounds appear to be a direct cause of the high nesting failure rates for murrelets in the redwoods parks.

These relationships measured with murrelets are consistent with studies of nest success of hundreds of other passerines. If the surrounding landscape has been permanently modified to change the predators' densities or carrying capacities (i.e. agriculture, urbanization or recreation), and the predators affected impact the species under study, the reproductive success of the prey species being studied is reduced. Because corvids account for the majority of depredations on murrelet nests and corvid density increases with human development, landscape effects of potential corvid predation on murrelet habitat is a primary impact consideration.

Demography and Vital Rates

The present population estimate for the murrelet in Oregon is 9,500 ($\pm 3,000$) and approximately 23,000 ($\pm 9,000$) within the conterminous United States (Strong 2003). Spiech and Wahl (1995) concluded that murrelet populations in Puget Sound are lower now than they were at the beginning of this century, and total estimates for Washington are still about 5,500 murrelets (Strong 2003). Ralph and Miller (1995) estimated the California population to be approximately 6,500 birds, and this estimate remains within the statistical confidence interval (Strong 2003).

Beissinger (1995) constructed a demographic model of the murrelet and concluded that the population may be declining at rates of 4-6% per year, but this estimate is hampered by the possibility that the age-ratio data used in the model are reflective of a relatively temporary decline due to unusual ocean conditions (Ralph *et al.* 1995). Boulanger *et al.* (1996) found that change in adult survivorship is the single most important factor when projecting demographic trends for murrelets. Similarly, Strong and Carten (2000) suggest that there may have been a 50% decline from 1992 to 1996 in the Oregon population, but appears to have stabilized since (Strong 2003). Ralph *et al.* (1995) summarized some of the reasons for variability in population estimates among researchers, including differences in methodology, assumptions, spatial coverage, and survey and model errors. Lank *et al.* (2003) states, "Regardless of the approaches

taken to estimate [(sic) vital rate] parameter values, the output from the Leslie matrix models representing survivorship and fecundity values for all populations in Washington, Oregon and California (Beissinger and Nur 1997) suggest negative population growth rates.” Present at-sea surveys for effectiveness monitoring have a 95% chance of detecting annual population changes of $\pm 20\%$ or greater.

Available Nesting Habitat

The precise number of acres of suitable habitat in WA, OR and CA is unknown. However, suitable habitat for the murrelet on federal lands is estimated at 2,492,000 acres of which 153,000 acres (6%) are classified as remnant habitat within the listed range of this species (USFWS 5-yr review 2003). Occupied murrelet habitat is protected on federal land under the NWFP in several ways. All occupied murrelet habitat automatically becomes LSR, regardless of the original designated land allocation. In addition, all “contiguous existing and recruitment habitat for marbled murrelets...within a 0.5-mile radius” becomes LSR (USDA and USDI 1994ab; C-10). Timber harvest within LSRs is designed to benefit the development of late-successional conditions, which should improve future conditions of murrelet nesting habitat. Designated LSRs not only protect habitat currently suitable to murrelets (whether occupied or not), but will also develop future suitable habitat in large blocks.

Murrelet Critical Habitat

Designation of critical habitat serves to identify lands which may be necessary for the conservation and recovery of listed species. On May 24, 1996, the Service published the final rule designating critical habitat for the murrelet in the *Federal Register* (USDI 1996). The final rule became effective June 24, 1996.

The Service’s primary objective in designating critical habitat was to identify existing terrestrial murrelet habitat that supported nesting, roosting, and other normal behaviors and require special management considerations. The Service designated critical habitat to protect murrelets and their habitat in a well-distributed manner throughout the three states. Critical habitat is primarily based on the LSRs identified in the NWFP (approximately 3 million of the 3.9 million acre boundary designation). The LSR system identifies large, contiguous blocks of late-successional forest that are to be managed for the conservation and development of the older forest features required by the murrelet, and as such, serve as an ideal basis for murrelet critical habitat. Where LSRs were not sufficient to provide habitat considered critical for the survival and recovery of the murrelet, other lands were identified, including state, county, and private lands.

The boundary of critical habitat for the murrelet encompasses approximately 3.9 million acres across Washington, Oregon and California. The Service focused on areas essential for successful murrelet nesting, when designating critical habitat. Therefore, within the boundaries of designated critical habitat, only those areas that contain one or more primary constituent element are, by definition, critical habitat. Areas without any primary constituent elements are excluded by definition. The primary constituent elements are: (1) individual trees with potential nesting platforms and (2) forested lands of at least one half site[potential tree height regardless of contiguity within 0.8 kilometers (0.5 miles) of individual trees with potential nesting platforms,

and that are used or potentially used by murrelets for nesting or roosting. The site-potential tree height is the average maximum height for trees given the local growing conditions, and is based on species-specific site index tables.

Bald Eagle

The bald eagle, which ranges throughout most of North America, was listed as a threatened species in Oregon due to population declines resulting from, among other factors, habitat loss, shooting, electrocution, poisoning and the adverse effects of the pesticide DDT (WDFW 1990). Eagles nest in the tops of large trees and are strongly associated with aquatic habitats, rarely nesting in Oregon further than one mile from water and their primary prey of fish (USDI 1995). Eagle nests can be up to 9 feet across and 3 feet deep, although in the Pacific Northwest nests are typically only 5 feet across (USDI 1986). Foraging eagles require perch trees with an unobstructed view adjacent to the water, a dependence that makes eagles specifically vulnerable to aquatic-associated recreational development (USDI 1995).

In Oregon, the eagle breeding season can start as early as January 1 and may extend until August 15 each year. Eagles are particularly sensitive to human disturbance during the breeding season, sometimes resulting in the abandonment of nests (USDI 1986). Incubation lasts approximately 35 days and the young are ready to fledge at about 11 to 12 weeks of age (USFWS 1999). Parental care, however, may continue 4 to 11 weeks after the young have fledged. Management guidelines published by the Department of the Interior (1981) recommend establishing primary and secondary zones around all known eagle nests and restricting the activities that occur within those zones. The primary zone is, at a minimum, 330 feet around the nest site and should be managed to protect or maintain the nest site by prohibiting timber harvest, mining, road or residential development, drilling or other disturbances that might alter the habitat. The secondary zone includes the area 660 feet around the nest and is designed to protect or maintain the habitat within the primary zone and to reduce disturbance of eagles during the breeding season. Disturbances could include timber harvest, blasting, firearms use, heavy machinery operation, camping or picnicking, etc. Habitat loss (resulting from timber harvest, recreational development, etc.) is the greatest long-term threat to eagle populations, even though shooting is the greatest single cause of mortality (USFWS 1986). The Pacific States Bald Eagle Recovery Plan (USDI 1986) established recovery population goals, habitat management goals, and management zones (*i.e.*, Recovery Zones) for a seven-state Pacific Recovery Region (Recovery Region). It outlined the following criteria for de-listing the eagle in the Recovery Region (USDI 1986):

- (1) There should be a minimum of 800 pairs nesting in the Recovery Region.
- (2) These pairs should be producing an annual average of at least 1.0 fledged young per pair, with an average success rate per occupied territory of not less than 65 percent over a 5-year period.
- (3) To ensure an acceptable distribution of nesting pairs, population recovery goals must be met in at least 80 percent of the management zones (*i.e.*, 38 out of 47 Recovery Zones) identified in the Recovery Plan.
- (4) Wintering populations should be stable or increasing.

Available information indicates that eagle populations are increasing range-wide. The species= status recovered sufficiently to warrant reclassification from endangered to threatened throughout the lower 48 states on July 12, 1995 (USDI 1995); this action did not change the status of the species for Oregon and Washington where eagles remain listed as threatened. In the Pacific Recovery Region, the number of occupied territories has consistently increased since 1986 and exceeded 800 beginning in 1990 when 861 territories were reported.

In Oregon, 401 breeding territories were occupied in 2002 (Isaacs and Anthony 2002). Productivity resulted in a five-year average of 1.01 young per occupied territory. Several Recovery Zones had productivity averages below 1.00 young per occupied territory in 2002, indicating that localized regions of poorer reproduction still persist within Oregon. Nesting success resulted in a five-year average of 64 percent per recovery zone.

The Rogue basin is considered part of the California and Oregon Coast eagle recovery zone (zone 23) which has a recovery goal of 28 breeding pair. This number is derived from a total territory goal of 52 with a 54 percent occupancy rate. In 2002, survey data indicate that there were 23 breeding eagle territories within the Oregon portion of zone 23, including 14 successful nests that produced 23 young (Isaacs and Anthony 2002). The Oregon portion of zone 23 had a 2002 average young per successful territory ratio of 1.64, well above the 1.0 target of the recovery plan. In 2002 alone, the average success rate for occupied territories in zone 23 was 89 percent.

On July 6, 1999, the Service (1999) proposed to delist the eagle in the lower 48 states because data showed that recovery goals had been met. For more detailed information on eagles in the Pacific Northwest, refer to the Pacific Bald Eagle Recovery Plan (USFWS 1986).

Vernal pool fairy shrimp

The vernal pool fairy shrimp is a member of the aquatic crustacean order Anostraca, in the Branchinectidae family. The species are endemic to vernal pools, an ephemeral freshwater habitat. The fairy shrimp are ecologically dependent on seasonal fluctuations in their habitat, such as absence or presence of water during specific times of the year, duration of inundation, and other environmental factors that include specific salinity, conductivity, dissolved solids, and pH levels. They are sporadic in their distribution, often inhabiting only one or a few pools in otherwise more widespread vernal pool complexes. Although the species has been collected from large vernal pools it tends to occur in smaller, frequently measuring less than 0.05 acres (<200 square meters) and shallower (mean of 5 cm) pools (Helm 1998). Genetic characteristics, as well as ecological conditions, indicate that populations are defined by pool complexes rather than by individual vernal pools.

Fairy shrimp inhabit vernal pools with clear to tea-colored water, most commonly in grass-or mud-bottomed swales, or basalt flow depression pools in unplowed grasslands. This species has a sporadic distribution within vernal pool complexes wherein the majority of pools in a given complex typically are not inhabited by the species. Eggs are dispersed by “hitching a ride” on

the legs or feet of wading birds or other animals passing through the pool, or by animals that ingest the eggs. Fairy shrimp typically are found at low population densities. Although they can mature quickly, allowing populations to persist in short-lived shallow pools, they also can persist later into the spring where pools are longer lasting.

At the time they were listed, 32 known populations of the vernal pool fairy shrimp were known, all within California. They were subsequently discovered in vernal pools of the Agate Desert landform in southern Oregon. Little is known about the intimacy of the relationship between fairy shrimp living in ephemeral pools and the surrounding terrestrial ecosystem.

Fairy shrimp have delicate elongate bodies, large-stalked compound eyes, no carapace, and eleven pairs of swimming legs. They swim or glide upside down by means of complex beating movements of the legs that pass in a wave-like anterior-to-posterior direction. While swimming on their backs, they feed on small particles of detritus, algal cells, and bacteria by scraping vegetation or other surfaces with their legs, or filtering the surrounding waters. The second pair of antennae in the adult females is cylindrical and elongate, but in the males these antennae are greatly enlarged and specialized for clasping the females during copulation. The females carry the eggs in an oval or elongate ventral brood sac. The eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks. The resting or summer eggs, also called diapause eggs, are not actually eggs, but cysts capable of withstanding heat, cold, and prolonged desiccation. After the eggs are fertilized, the embryo undergoes additional development to the nauplius or metanauplius stage before entering diapause.

When the pools refill in the same or subsequent seasons some, but not all, of the cysts may hatch. Branchiopods respond to inherent variability in climatic conditions by producing eggs with different diapause characteristics in each clutch. Some hatch after drying and getting wet again; while others may go through several wet/dry cycles before they hatch. The cyst bank in the soil may also be comprised of individuals from several years of breeding. The species typically produces only one clutch of eggs each year and then dies. Vernal pool fairy shrimp have been collected from early December to early May.

Fairy shrimp first hatch at the bottom of the vernal pool when water temperatures reach 10 degrees Celsius. Under optimal conditions they undergo a series of molts before reaching maturity in about 2 ½ weeks, when they are approximately 5-20 millimeters (mm) (0.2 inches - 0.8 inches (in.)) in length. They have been reported to live anywhere from 2-4 ½ months, depending on many environmental factors (Eriksen and Belk 1999). These subpopulations often disappear early in the season long before the vernal pools dry up. Many species of insects, amphibians, waterfowl and crustaceans prey on vernal pool fairy shrimp, making this species an extremely important link in the food web, particularly as a supply of energy for migratory birds.

The Service listed the fairy shrimp as a threatened species primarily due to the present or threatened destruction, modification, or curtailment of their habitat or range. They determined that “the habitat of these animals is imperiled by a variety of human-caused activities, primarily urban development, water supply/flood control activities, and conversion of land to agricultural use. Habitat loss occurs from direct destruction and modification of pools due to filling,

grading, discing, leveling, and other activities, as well as modification of surrounding uplands that alters vernal pool watersheds.” The Service recently (August 6 2003) designated critical habitat for the fairy shrimp, three other crustaceans and eleven species of vernal pool associated plants in California and Oregon (Federal Register Vol. 68, number 151). The final rule designated 1,184,513 acres of critical habitat throughout the range of the species.

Cook’s lomatium

Cook’s lomatium (lomatium) was listed as a candidate for listing in 1990 and the State of Oregon listed it as State Endangered in 1995. In May 2000, it was proposed for listing (Federal Register 65:30941-30951, May 15, 2000), and the comment period was re-opened in January of 2002. It was listed as federally endangered in November of 2002 (Federal Register 67:68004-68015, November 7, 2002). Critical habitat was not designated.

A perennial herb in the carrot family (*Apiaceae*), Cook’s lomatium grows 1.5 to 5 decimeters (dm) (6 to 20 in) tall, from a slender, twisted taproot. Leaves are smooth, finely dissected, and strictly basal (growing directly above the taproot on the ground, not along the stems). The plant produces one to four groups of clustered, pale yellow flowers and boat-shaped fruits 8 to 13 mm (0.3 to 0.5 in.) long with thickened margins. The taproot can often branch at ground level to produce multiple stems.

The plant occurs both in the Agate Desert, Jackson County, Oregon, on the edge of vernal pools, and in the Illinois River Valley, in seasonally wet grassy meadows in Josephine County, Oregon. In the Agate Desert, 13 occurrences exist within the historical floodplain of the Rogue River on non-federal land. In the Illinois River valley, 25 occurrences are known in the areas of Reeves creek, Fry Gulch, Indian Hill, Rough and Ready Creek, Woodcock Creek, and in the French Flat ACEC. No populations have ever been found between these regional populations along the Rogue River or in alluvial areas along the lower Applegate River and suitable habitat would not likely be present. Undiscovered populations occurring between the Agate Desert and the Illinois valley populations are not likely.

In the Agate Desert, its habitat is along the margins and bottoms of vernal pools. These pools, within swale and mound topography, form during the winter rains in shallow clayey-gravelly soils over an impervious hardpan. The Illinois Valley habitats are mostly alluvial silts and clays within serpentine soils. The soils consist of flood plain bench deposits that also have a clay hardpan 60-90 cm below the soil surface. This creates seasonally wet areas similar to vernal pools in the Agate desert, but lacks the swale and mound topography (i.e., no pools). The Illinois Valley sites are alluvial in nature within serpentine substrates and are within the serpentine valley bottom communities. The meadows are dominated by California oat-grass and occur within Oregon white oak – ponderosa pine/Jeffery pine savanna. An open shrub layer comprised of wedge-leaf ceanothus and white-leaf manzanita is interspersed with native and introduced grasses and herbs. No estimates of suitable habitat for Cook’s lomatium have been compiled for the Illinois Valley.

Lomatium flower from February to mid May and set fruit from April to June. The pollinators of the plants are likely andrenid bees (Kaye 2002), and a small unidentified black moth has been documented visiting umbels (Kagan 1986).

Annual monitoring of three populations (Indian Hill, Rough and Ready and French Flat ACEC) on BLM lands since 1994 has revealed large variations in population densities and reproduction, with numbers fluctuating year to year seemingly in response to undefined environmental changes. At these three sites (French Flat ACEC is the largest) the 2003 population numbers are: 198,293 plants at French Flat, 1,148 plants at Rough and Ready, and 7,084 plants at Indian Hill (Kaye 2002). Most of the other populations in the valley are small, with less than 50 plants. The total population in the Illinois Valley is not known, but is estimated to be less than 250,000 plants on 150 acres of occupied habitat (USDI BLM 2002). Because of the small occupied acreage, scattered distribution, and threats to its habitat (development and off-highway vehicle impacts in occupied habitat) the trend for populations in the Illinois Valley is downward.

Gentner's fritillary

In 1980, Gentner's fritillary was identified as a Candidate species for federal listing as a Category 2 species. The BLM and Oregon Natural Heritage have tracked this species since the early 1980's. The plant was listed as endangered on December 10, 1999 (64 FR 237, 1999) without Critical habitat designation. A final recovery plan was published in 2003 (USDI 2003b).

The plant is a perennial herb arising from a fleshy bulb producing several large scales surrounded by numerous small rice-grained bulblets. Non-flowering plants vastly outnumber flowering plants in natural populations, and are recognizable only by their single ovate to lanceolate basal leaf that is indistinguishable from several other common related fritillaries. The plant has dull to bright, red to maroon-colored, flowers mottled or streaked with yellow. The flowers are solitary, or in bracted racemes, 1 to 7 (rarely more) on long slender pedicels. The 25-40 mm bell-shaped flower has segments that bend more or less outward, but are not strongly recurved like the common scarlet fritillary (*Fritillaria recurva*).

The plant blooms from early April through late May, and as late as June 15th, depending on precipitation, temperature, and herbivory. Reproduction is mostly asexual. Small plants often arise from near the base of larger flowering plants, presumably from under ground "clonal" bulblets coming off the "mother" bulbs. Amsberry and Meinke (2002) documented between 10 – 200 rice-grain bulblets attached to mature mother bulbs on 25 excavated plants.

The plant occurs in a variety of habitats including oak woodlands dominated by Oregon white oak (*Quercus garryana*) mixed hardwood forest dominated by California black oak (*Quercus kelloggii*), Oregon white oak, and madrone (*Arbutus menziesii*), and coniferous forests dominated by madrone and Douglas-fir (*Pseudotsuga menziesii*). It has been found growing on the edges of grasslands and chaparral, and in open mixed evergreen forest and woodland openings. It is most often found in forest ecotones or transitional areas, especially along ridgelines or aspect changes. The 25 soil types the plant has been known to occur on are Abegg,

Beckman-Colestine complex, Brader-Debenger complex, Caris-Offenbacher complex, Carney, Cornutt-Dubakelia complex, Dubakella-Pearsoll complex, Farva, Holland, Langellain, Langellain-Brader complex, Manita, McMullin-Rock Outcrop complex, McNull-Medico complex, McNull-McMullin complex, Newberg, Ruch, Tallowbox, Tatouche, Vannoy, Vannoy-Voorhies complex, Woodseye-Rock Outcrop complex and Xerothents-Dumps complex (USDI 2003b). The soil type most commonly supporting the plant is Vannoy.

]

This species prefers situations where it can receive at least partial light (Brock and Callagan 2001). It is rarely found under a dense conifer canopy, although a few “riparian” populations (riparian ecotones) have a high cover of mixed conifer and deciduous trees. It appears to have a moisture requirement because it has not been found in fully exposed rocky, skeletal soil types (e.g. open grasslands), but rather prefers a level of soil moisture also capable of supporting trees and shrubs.

No estimates of suitable habitat within its range have been done for this species.

The life history of the plant is similar to the black lily (*Fritillaria camtschatcensis*) that occurs along the west coast from northern Washington to Kodiak Island in coastal Alaska. Yonezawa (2000) has determined that at least 20,000 vegetative and flowering plants are necessary to conserve the normal level of gene diversity for a meta-population. Using data provided by Brock and Callagan (2000), current estimates indicate that for every flowering fritillary there are on average 14.7 vegetative juvenile plants within 8 inches of the base of flowering plants, 1.5 mature non-flowering plants associated with each flowering plant, and an average of 14.7 juvenile plants at the base of each mature plant. Thus a meta-population of 500 flowering plants would have an average of 19,750 plants total, an increase of 39.5 fold. An estimated minimum of 500 flowering plants is needed to maintain each meta-population.

Vegetatively, the fritillary and scarlet lily are indistinguishable, and the plants often grow together. Surveying for presence and monitoring the numbers of this species produces variable results. An accurate count of the number of individuals is difficult to obtain because many mature plants do not flower for several years. Flowering plants also may be grazed before setting flowers and are, therefore, difficult to locate and census. Numbers of flowering plants vary greatly from year to year. For example, at Picket Creek, the number of flowering plants at one population has varied from as low as 79 in 1999 to 306 in 2000.

Within the Rogue basin, populations have been documented as far west as Pickett Creek near Merlin, north of Sexton Mountain, around the City of Grants Pass, and north of Murphy. A large number of populations occur in the Middle and Little Applegate drainage, around Jacksonville, and in the Gold Hill and Sam’s Valley area. It is also documented to the northeast in Big Butte Creek, and another pocket of occurrences is in the Colestine valley and south of Soda Mountain in the Cascade - Siskiyou National Monument (Klamath sub-basin), California. Most of the known occurrences on private lands occur in close proximity to the cities of Jacksonville and Grants Pass (M. Mousseaux Pers. Comm. 2003)

The elevations of known occurrences range from 600 feet (near the Rogue River) to over 4,500 feet near Soda Mountain, and it can occur on nearly all aspects if the right habitat conditions are

present. It does not appear to be an early colonizer of recently disturbed habitat, nor a “late successional” species found in “old growth,” closed canopy forests. Its relationship with disturbance is not clear, although it exists in communities that had fairly frequent fire return intervals historically. Anecdotal evidence suggests that it is adapted to fire, especially later in the summer when it has gone dormant and exists as an underground bulb.

On BLM sites the total counts at 42 sites over 4 years have varied from 381 flowering plants in 1999 to 925 in 2002. True population sizes (distinct individuals) are not known for any fritillary sites, but assuming a one to seven ratio between flowering and vegetative plants, the estimated four-year average population is about 5,312 plants (all life stages) at the 42 monitored sites. There are 125 known occurrences for the plant on federal and non-federal lands. There are 77 sites (62 percent) on federal lands (75 BLM & 2 Forest Service), 16 sites (13 percent) on State, County, or City owned public lands, and 32 sites (25 percent) on private lands (USDI 2003b). About 2000 flowering plants are documented, and it is estimated that about 78,500 vegetative plants exist. Three populations on private lands are believed to be extirpated.

Because of small population sizes, and widely scattered populations, the Service believes that for some of the sub-populations of the fritillary, viability is in question. As a result, the recovery plan calls for intensive augmentation of populations with nursery grown plants. Currently the existing trend for the species is downward.

Large flowered woolly meadowfoam

Meadowfoam (*Limnanthes floccosa* spp. *grandiflora*) is a delicate annual in the meadowfoam, or false mermaid family (*Limnanthaceae*). The plant grows 5 to 15 centimeters (cm) (2 to 6 in) tall, with 5 cm (2 in) leaves divided into 5 to 9 segments. The stems and leaves are sparsely covered with short, fuzzy hairs. The flowers, and especially the calyx (outer whorl of floral parts), are densely covered with woolly hairs. Each of the 5 yellowish to white petals is relatively long compared to other meadowfoams, 6 to 13 mm (0.2 to 0.5 in.), and has 2 rows of hairs near its base.

This plant had been a candidate for listing since 1980 (45 FR 82480). In May of 2000 it was proposed for listing (Federal Register 65:30941-30951, May 15, 2000), and the comment period was re-opened in January of 2002. It was listed as federally endangered in November of 2002 (Federal Register 67:68004-68015, November 7, 2002) in the same listing package as *Lomatium cookii*. Critical habitat was not designated.

The current range of the species basically extends along the floor of the Rogue River from south of Shady cove, down river to Gold hill, along the historical floodplain of the Rogue River. Like *lomatium* in the Agate desert, it is associated with vernal pools in swale and mound topography, except that large-flowered woolly meadowfoam grows on the wetter inner fringes of vernal pools and is not known from wet meadows. This species is now only known from the Agate desert, located on the valley floor of the Rogue River just north of Medford, Oregon in an area of rapidly expanding development. Populations have not been found on federal lands within its range, even though suitable habitat exists (most suitable habitat has been surveyed). One area

with vernal pools on federal lands (the Table Rocks ACEC) has been extensively surveyed and does not have this species, even though it's within a few miles of existing occurrences. The current mapped habitat for these species in the Agate Desert totals 198 ac (ONHP Database 1998). However, due to recent alteration and destruction of vernal pools in the Agate Desert (ONHP 1997), habitat currently occupied by these plants is considerably less, an estimated 116 acres (ONHP Database 1998). No estimates of suitable habitat on federal lands in its range have been done.

The plant flowers from February to April and fruits from April to May. Only 22 occurrences of large-flowered woolly meadowfoam are known on non-federal lands in the Agate Desert are known. The numbers of plants are unknown, but probably are less than a 100,000 in this small area. Because of the existing threats to habitat, and the small amount of occupied habitat, the current trend for the species is downward.

McDonald's rockcress

McDonald's rockcress (rockcress) was the second plant species listed as endangered by the Service on September 28, 1978 (43FR44810). A critical habitat determination was not made for this species. At the time of listing, only one population of the plant was known, and it was in imminent danger of being destroyed by nickel mining. It was known only on Red Mountain of the North Coast Range of California in Mendocino County. In 1979 and 1980 additional collections made in northern California were determined by Goforth (1980) to be a rediscovery of McDonald's rockcress in Del Norte County. The plants discovered in Del Norte County have a wider distribution and are significantly more abundant there than in Mendocino County. Goforth reported that approximately 200 colonies were located in Del Norte County and one very small colony (fewer than 10 individuals) in adjacent Curry County, Oregon. This extended range of the species was not recognized by the Service until 1997.

Rollins suggested that the taxonomy of the whole species group, especially the relationships of McDonald's rockcress and Waldo rockcress, be reexamined (USDI 1990). In the Jepson Manual Higher Plants of California (Hickman 1993), the range of rockcress was extended to Siskiyou County, California and Curry County, Oregon by its inclusion of Preston Peak rockcress (*Arabis serpentinicola*). Vorobik (2002) further revised the range of rockcress to include Del Norte County, California, and Josephine County, Oregon. Thus, the range for McDonald's rockcress has expanded to include five counties, three in California and two in Oregon. Other known populations are found on Siskiyou National Forest between North Fork Smith River and Diamond Creek, and Packsaddle Mountain.

McDonald's rock-cress is a member of the mustard family (Brassicaceae) and genus *Arabis*. Within the genus *Arabis* is a group of five perennial species of the coast ranges of northwestern California and southwestern Oregon that have purple flowers and a rosette. Members of this group besides McDonald's rockcress include Waldo rockcress (*A. aculeolata*), Oregon rockcress (*A. oregana*), modest rockcress (*A. modesta*), and coast rockcress (*A. blepharophylla*). McDonald's rockcress is most closely related to Waldo rockcress.

McDonald's rockcress occurs on barren to shrub-covered shallow, rocky, ultramafic soils which are peridotite in origin (Jeffrey pine woodland community). Elevation ranges from 2000 to 4,000 feet. Serpentine barren habitat, usually on steep unstable slopes or dry open woods below 4900 ft (1500m) is preferred. Most areas are recently disturbed, exposing less weathered serpentine soil. Canopy cover is generally less than 3 percent.

Goforth (1980) estimated the total number throughout the extent of the population between 20,000 and 50,000 individuals (USDI 1990). In the next several years ten additional new populations were documented in Oregon averaging 5 to 400 individuals each. The plant has since been identified at 70 sites that total 639,789 square meters in Mendocino, Del Norte, and Siskiyou counties, in California and Curry and Josephine counties in Oregon (Service data as of December 28, 2000). Of the 70 sites, sixteen are administered by Rogue River – Siskiyou National Forest. Current Service estimates for the total population size are from 43,250 to 43,300.

In 2002 the Biscuit Fire burned through many populations. Several populations on National Forest lands located along the ridgeline separating Rough and Ready Creek from Josephine Creek were impacted by the construction of a fire break installed during the Biscuit Fire. Two populations of rockcress recently were negatively impacted by direct crushing and burying of the plants and by loss of habitat. Many sites have not been surveyed since the mid 1980's, so numbers may not be accurate, and many sites earlier reported as declining may in fact have been extirpated by now. The current overall trend for the species is stable to downward.

IV. Environmental Baseline

The Environmental Baseline is defined as the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process [50CFR 402.02].@

Spotted Owl

In 2001, the Service completed a baseline evaluation of the SW Oregon administrative units (USFWS 2001b). This assessment updated the current condition of the spotted owl and its critical habitat in the SW Oregon administrative units at that time by presenting information on changes in the environmental baseline relative to that established in the FSEIS (USDA and USDI 1994) in 1994. The baseline assessment analyzed the condition of the SW Oregon administrative units= reserves, connectivity within and between physiographic provinces and between reserves, critical habitat at the scale of the physiographic provinces, and the impacts of past incidental take. In addition to updating the baseline acres of spotted owl habitat, the assessment also discusses threats to the spotted owl and the most current data from two demographic study areas, and presented conclusions on the status of the spotted owl within the SW Oregon administrative units. Since that baseline update the agencies have provided information on the effects to spotted owl habitat from timber harvest, fires, and other habitat altering activities. This information has been used to update the SW Oregon

administrative units baseline information that was used in the FY01-03 biological opinion and is used in this Opinion's current environmental baseline.

According to the FSEIS baseline and the updated administrative unit information on timber harvest, fires, and other habitat altering activities, there are currently 763,559 acres of spotted owl NRF within the SW Oregon administrative units (Table 6). These acres are divided among various land-use allocations as indicated in Table 6. The SW Oregon administrative units have generated additional baseline information (USDA and USDI 1998) on spotted owl habitat since the implementation of the NWFP. This additional data has partially formed the basis for the FY 97/98, FY 99/00, and FY01-03 consultations. For the SNF and the RRNF, these newer data are based on 1989 satellite images as interpreted by Pacific Meridian Resources, which have been updated using the Forest Service's managed stand data. The BLM data are derived from their timber sale operational inventory database which is based on stand exam data. In 1996, this baseline data indicated there were 1,060,728 acres of spotted owl habitat in SW Oregon (USDA and USDI 1998), in contrast with the FSEIS figure of 913,497 acres. The SW administrative unit's baseline currently shows there are 903,471 acres of NRF within the action area in contrast to the current FSEIS baseline of 763,559 acres. The baseline data generated by the SW Oregon administrative units are not used for analysis in this Opinion with the exception of the spotted owl dispersal map (Figure 1) because the FSEIS data are recognized by all federal agencies and are more conservative than the updated baseline. However, the FSEIS data could not be used to develop the map because it did not delineate spotted owl dispersal habitat which is an important component of this spatial analysis.

Within LSRs, there are currently about 430,000 acres of NRF; a reduction of approximately 47,000 acres (11 percent) since 1994 (Appendix B). A small amount of the lost spotted owl habitat acres (710) in LSR were the result of several Congressionally-mandated 318 timber sales, a research project, a mining project and a fire hazard reduction project.

A significant amount of NRF was lost in the Biscuit Fire of 2002. The Biscuit fire burned almost 500,000 acres; including approximately 95,500 acres of spotted owl NRF, approximately 45,000 of this NRF loss was located in four LSRs.

The South Chetco LSR (RO250) lost 755 acres of NRF, about 3 percent of the total NRF within that LSR. Post-Biscuit Fire, 44 percent of the capable lands are currently older forest, defined by the BLM and Forest Service as those forests with trees of 21 inch DBH or greater. Pre-Biscuit Fire, the LSR historically supported 20 activity centers for the spotted owl. Twelve of the 20 (60%) centers had less than 30 percent of their home range in owl habitat. Only one of the 20 home ranges encompassed more than 40 percent owl habitat. Post-Biscuit Fire, five activity centers in the Fire area suffered reductions in NRF.

The North Chetco LSR (RO252) lost 2,458 acres of NRF, about 26 percent of the total NRF within that LSR. Pre-Biscuit Fire, the LSR historically supported four activity centers for the spotted owl. One of these owl home ranges had less than 30 percent owl habitat. Another home range had greater than 40 percent owl habitat. Post-Biscuit Fire, all activity centers in the Fire area suffered reductions in NRF.

The Fish Hook/Galice LSR (RO255/RO256/RO258) lost 24,872 acres of NRF, about 42 percent of the total NRF within that LSR. Ninety-three percent of the LSR is capable of growing spotted owl habitat. Of these capable lands, 42 percent are currently older forests. Pre-Biscuit Fire, the LSR historically supported 53 activity centers. Forty-one activity centers (77%) had greater than 30 percent of their home range as owl habitat, and 45 (88%) of the 51 home ranges contained greater than 40 percent spotted owl habitat. Two spotted owl activity centers (4%) had less than 30 percent owl habitat. Post-Biscuit Fire, 19 activity centers in the Fire area suffered reductions in NRF.

The West Illinois Valley/Briggs LSR (RO253) lost 17,466 acres of NRF, about 75 percent of the NRF within that LSR. Pre-Biscuit Fire, the LSR historically supported eleven activity centers for the spotted owl. One of these centers had less than 30 percent of its home range in owl habitat. Two activity centers had greater than 30 percent of their home range as owl habitat, 7 (64%) centers had greater than 40 percent of their home range in owl habitat. Post-Biscuit Fire, seven activity centers in the Fire area suffered reductions in NRF.

Approximately 50 spotted owl historical sites, approximately ten percent of the total known spotted owl sites located within protected land allocations (including allocations other than LSR such as wilderness) within the action area, were located within or adjacent to the fire's perimeter. Of those 50 owl sites, suitable habitat is below 40 percent in 41 provincial home ranges; of these 41, nine home ranges contain between 30 and 39 percent suitable habitat, seven contain between 20 and 29 percent, and 21 home ranges contain less than 20 percent. The other nine known sites maintained at least 40 percent suitable habitat within their respective home ranges post fire. However, 69,168 acres of NRF still remain within these four LSRs, which would still provide an average of 1,500 acres for each of the 46 spotted owl pairs within these LSRs. The Biscuit Fire burned, in large part, in a mosaic pattern across the landscape and it is likely that some of the known ranges of spotted owls have only been degraded to some extent. However, there were some larger areas of complete loss of large tracts of forest where it is likely that some owl activity centers were entirely consumed and lost. While adverse affects to spotted owls can be detected when habitat levels fall below approximately 40 percent within a given home range, there is a dramatic effect to productivity and occupancy of spotted owl sites when available habitat drops to below 20 percent. Research by Bart and Forsman (1992) showed that approximately 50 times more young spotted owls are fledged/km² in areas with >60 percent older forests than in areas with <20 percent older forest. Furthermore, areas with <20 percent forest rarely have spotted owls and all productivity and abundance measures are significantly less than areas with more older forest. Therefore it is likely that at least the nine activity centers that had reductions to below 20 percent habitat within their respective home ranges, may have been significantly affected by the fire and may no longer be viable.

The Timbered Rock fire burned approximately 1,200 of spotted owl NRF within LSR RO224 and affected at least 18 spotted owl sites, 13 active spotted owl sites and 5 inactive historic sites on federal lands within the Upper Rogue River drainage. At least two sites were completely burned over and may no longer be viable. Of the other 16, six sites lost more than 50 percent of NRF within their respective home ranges and the remaining pairs lost less than 50 percent of the NRF within their home range. Based on the amount of remaining habitat within a half mile of

the active owl sites, the BLM estimated that nine of the sites had at least a 60 percent chance of being occupied post fire and four sites had a ten percent or less chance of being occupied. However, protocol surveys conducted in 2003 after the fire detected owls at seven of the 13 sites that had been active before the fire; one of the four sites that were thought to have less than a ten percent chance of being occupied had a positive detection of a non-breeding pair.

In all, approximately 14 percent of the known spotted sites within reserve land allocations may have been affected by habitat loss due to fire. For a majority of the sites, it is unknown to what extent these sites will continue to be used by spotted owls and there is little information or literature on the response of spotted owls to fire. Analysis of the habitat remaining to known spotted owl activity centers within the two fire perimeters leads the Service to estimate that at least 13 owl pairs may no longer be extant. The Medford BLM and Siskiyou NF are both conducting surveys in these fire areas in an attempt to determine what the response of these owls will be towards these large fires. In addition, there could be effects to spotted owl reproduction rates to those owls affected by the fires due to reductions in available habitat as well as reductions in forage habitat and the short term loss or reduction of prey species that may have been affected by the fires. Predation and competition by other species could also increase due to habitat alteration that could allow other species to invade the remaining habitat. However, while there is the potential for the loss some owl pairs and impacts to up to 14 percent of the spotted owls within reserve land allocations due to the fires, it is likely that the remaining LSRs will continue to function and the clusters of spotted owl within those LSR will continue to provide a viable breeding population within the action area.

The NRF loss within LSRs due to fires has been significant (10 percent) and largely confined to one area and four LSRs. However, there is still habitat remaining (69,000 acres) within these four LSRs that is still available to spotted owls and over 50,000 acres of NRF is available in wilderness immediately adjacent to these LSRs as well as over 100,000 acres of habitat within the adjacent LSR RO255. Within the entire basin, 391,245 acres of NRF is available within the remaining LSRs, and there are over 400 historic pairs of owls within these LSRs. Because of the built in redundancy of the LSR system, the remaining habitat within the affected LSRs, the relatively small change in those LSRs not affected by fires, and the number of owls pairs still likely remaining in those LSRs, the ability of the LSR system in the Rogue Basin to provide for clusters of reproducing pairs of spotted owls will likely still function as intended under the NWFP.

The other change in spotted owl NRF has occurred in the Matrix and AMA allocations, where through the end of fiscal year 2003, the Service has issued incidental take for 49,120 acres for NRF that has been removed or downgraded since 1994. However, to date, only 37,857 acres of habitat removal or downgrading have been or will be implemented by the end of FY03. The potential impacts of the loss of this unreserved (where programmed timber harvest is anticipated) spotted owl habitat include the reduced ability for spotted owls to reproduce outside of reserves, the reduced ability for spotted owls to forage and establish territories outside of reserves, and a reduction in the capability of the landscape to facilitate spotted owl connectivity between LSRs and between physiographic provinces.

However, the agencies constructed a map (Figure 1) depicting the distribution of habitat that facilitates spotted owl dispersal (dispersal and suitable habitat combined) within the action area.

Because the FSEIS data includes only spotted owl NRF and not spotted owl dispersal habitat, the agencies generated this map using current spotted owl habitat GIS layers from the SW Oregon administrative units.

Using these data, the agencies color-coded each square-mile section of federal land within the Rogue River basin and South Coast drainages based on the percentage of federal, forest-capable lands that provide for spotted owl dispersal. Those sections with ≥ 60 percent of federal, forest-capable lands that provide dispersal habitat or better are coded dark green, sections with 50 to 59 percent dispersal habitat are coded light green, sections with 40 to 49 percent dispersal habitat are coded yellow and sections with ≤ 40 percent dispersal habitat are coded orange. Those areas not capable of growing spotted owl dispersal habitat due to forest or soil type are coded red. Based on the 50-11-40 principle (Thomas et al. 1990), we assume that quarter townships comprised of 50 percent or more spotted owl dispersal (or better) habitat adequately provide for spotted owl dispersal. Using a similar assumption to the 50-11-40 rule, if more than 50 percent of a given watershed is shown to have at least 50 percent of its federal lands providing sufficient dispersal habitat it is also assumed to adequately provide for dispersal across the landscape.

Figure 1 indicates that federal lands currently provide connectivity between LSRs along the southern Cascades, along the Siskiyou crest to the Coast Range and along the Rogue-Umpqua divide. Because federally-managed land in the Ashland I-5 corridor is sparsely distributed this part of the province was termed an Area of concern by the Service (Tweten 1992, unpubl. lit.). In most Sections, greater than 60 percent of the Federally-managed land in this area functions as dispersal habitat or better, although it is interspersed with private property. Telemetry data in this area also indicates that spotted owls can readily cross this corridor (Miller 1989, Forsman et al 2002) between the Siskiyou and Cascade Ranges.

The agencies dispersal habitat analysis of all Section 7 watersheds in the basin shows that currently, 65 percent of the federal acres within the basin are providing dispersal or better habitat and all of the Section 7 watersheds within the basin have more than fifty percent dispersal habitat. Only two watersheds, the Chetco/South Coast and the Illinois Valley, have less than sixty percent dispersal habitat within their respective boundaries (Appendix C). This is largely due to the Biscuit Fire which reduced dispersal habitat within these watersheds by over 120,000 acres. In both of these watersheds, more than 50 percent of the federal lands currently provide dispersal habitat for spotted owls.

The SW Oregon administrative units' dispersal condition map indicates a potential spotted owl dispersal area of concern that was previously identified in the last Opinion (USFWS 2001c). The connection from the Cascades to the Coast range along the Siskiyou crest was assumed to connect to the southern SNF. This area of the SNF is largely serpentine soil, which is ineffective at producing dense conifer stands or traditional spotted owl dispersal habitat of 11 inch DBH trees and a 40 percent canopy closure. Based on the dispersal map, it appears that the best connection from the Cascades to the Coast range along the Siskiyou is through the Cheney-Slate portion of the Applegate AMA. This route goes through checkerboarded BLM lands and into the SNF in Township 37S, Ranges 7 and 8W. Overall, the map (Figures 1) demonstrates that, post Biscuit Fire, the current condition of the habitat within the SW Oregon administrative units will facilitate the movement of spotted owls between LSRs and between

physiographic provinces. In addition, Eric Forsman, an Oregon State University researcher involved in the study of spotted owl dispersal, reviewed a map of dispersal habitat post Biscuit fire and concluded that the Biscuit Fire would not pose a significant barrier to dispersal of spotted owls, or if it did, the owls had other avenues in which to disperse (E. Forsman. pers. comm.). In addition, Forsman's recent work (2002) shows that owls move across other areas of concern with fragmented habitat and checker board ownerships such as the south Willamette Valley, the Galesville I-5 corridor, and the Siskiyou Crest I 5 area of concern.

Table 6. Current NRF Baseline															
ADMINISTRATIVE UNITS: MEDFORD BLM, SISKIYOU NF, ROGUE RIVER NF															
	TOTAL	% Δ	LSR	% Δ	MATRIX	% Δ	AMA	% Δ	CWA/AWA	% Δ	PRIVATE	% Δ	UNKNOWN	% Δ	
NRF	2001 BASELINE ^{1/}	882,627	C	448,050	C	255,376	C	72,505	C	110,689	C	unk	C	unk	C
	removed	115,240 ^{3/}	13	56,805 ^{4/}	11	11,104	4	5,710	8	42,495	38				
	downgraded	6,794	0.7	0	0.0	4,716	2	2,078	3	0					
	degraded	3,842		40		2,892		550		0					
	added	0		0		0		0		0			0		
	2003 Baseline ^{2/}	760,529		391,245		239,557		64,717		68,194		0		0	
	dispersal removed	166				253					0				
	trees removed														
acres harassed	unk		unk		unk		unk		unk		unk				

^{1/} This baseline from the 2001 Environmental Baseline Update and 2001 Rogue Basin BO 1-7-01-F-032

^{2/} Represents 2001 baseline minus removed/downgraded NRF acres

^{3/} All habitat loss is due to fires except for 11,041 acres of habitat loss due to timber sales

^{4/} All LSR habitat loss is due to fires

Two demographic study areas that include portions of the SW Oregon administrative units. Southern Oregon Cascades demographic study indicates an annual decline between 15 and 16 percent while the Klamath demographic study area range of possible annual population change includes 1.0, indicating that the population may be stable (Franklin et al. 1999). These data do not, however, account for spotted owl emigration from the study area which may cause an overestimate of the actual annual population decline. Because the demography studies are designed to measure long-term trends, the current information has limited application to the day-to-day consultation process. However, the Service will continue to monitor annual demographic study area reports and track population trends, the next demographic analyses are due in January 2004.

In the 2002 an annual report of spotted owl surveys conducted in the South Cascades demography study area was released (Anthony et al 2002). During that year, 162 locations in both Matrix and LSRs land allocations were surveyed to protocol, and spotted owls occupied 69% of the sites visited. The report showed that spotted owls occupied 36 Matrix and 67 LSR sites and in the Matrix allocation, the percentage of occupied sites increased in 2002 (68 percent) compared to 2001 (57 percent). The percentage of sites occupied by owl pairs in the Matrix (47 percent) was similar to 2001 (45 percent). Between 2002 and 2001, the percentage of occupied sites in the LSRs (71 vs. 69 percent) and the percentage of sites occupied by owl pairs (54 vs. 53 percent) were largely unchanged. The percentage of occupied sites with owl pairs in the LSRs was similar to 2001 (76 vs. 77 percent), while in the Matrix there was a decline (69 vs. 79 percent). The average number of young produced per total number of pairs surveyed to protocol in 2002 was 1.30, which was greater than the mean for all years of the study. The average number of young produced per successfully reproducing pair in 2002 (1.88) was higher than in most years (0 = 1.66). The average fecundity recorded for 2002 in both LSR (0.69) and Matrix (0.52) allocations was greater than or equaled any preceding year.

Although few surveys have been conducted specifically for barred owls, they regularly respond to standard spotted owl surveys and appear to have become established in the action area and in other parts of the spotted owl range over the past 15 years or more (USDI and USDA 2001). Since 1987, barred owls have been sighted on the Siskiyou NF on at least 65 occasions including detection of six barred owl pairs. On the Rogue River NF, on the Cascades Zone, barred owls are known to have displaced spotted owls at three sites, and in 2000, a spotted-barred hybrid (or Asparred@ owl) was known to have paired with a barred owl, although this nesting attempt failed. Medford BLM has documented 15 sites where barred owls have been located multiple times (USDA and USDI 2001). The annual report on the demography work currently being conducted in the South Cascades study area (the Rogue Basin and the Winema NF) shows that the percentage of historic spotted owl sites with both spotted owls and barred owls, or barred owls only, has increased from 3.3 to 17.3 percent within the study area since 1997 (Anthony et al 2002). It is currently unclear what impact the barred owl will have on the spotted owl but there is evidence that barred owls may displace spotted owls when the two species establish territories in close proximity (E. Kelly, 2001).

Based on available data, while the condition of the SW Oregon administrative units= LSRs has changed since they were established, largely due to fires, since they were established, habitat exists within those LSRs that will support clusters on spotted owls and habitat also exists within the action area that should facilitate the movement of spotted owls between those LSRs and

across the landscape. The condition of the landscape, therefore, should support the conservation needs of the spotted owl and contribute to the recovery of spotted owls by providing for clusters of reproducing spotted owls and the connectivity between those clusters.

Spotted Owl Critical Habitat

The Service (Tweten 1992, unpubl. lit.) published a memo in conjunction with the designation of spotted owl critical habitat that outlined the expected contribution of each of Oregon's CHUs to spotted owls. In that document, he discussed the roles of a majority CHUs within the Rogue and South Coast Basins as primarily having a role in providing connectivity for spotted owls as well as for providing some NRF within both Basins. Within the SW Oregon administrative units, there are approximately 913,000 acres of spotted owl critical habitat, of which approximately 450,568 acres (50 %) is currently spotted owl NRF. This is approximately 15 percent of the range-wide CHU NRF currently extant within the range of the spotted owl. Since 1994, the Service has consulted on the removal (including downgrading) of 24,168 acres of NRF (5 % of the critical habitat NRF) in spotted owl critical habitat. However, only 9,005 (2 % of the critical habitat NRF) of these consulted-on acres will be or have been affected through Fiscal Year 2003 (Table 7). Only those acres prior to 2001 have been returned to the baseline at this time, CHU acres consulted but not implemented on from 2001 to the present will be returned to the baseline in FY 2004. Fires in the action area have impacted CHU habitat, in particular, the Biscuit Fire of 2002. In all, 25,329 acres (8 percent of the critical habitat NRF) was lost due to fire in seven CHUs, most notably from CHUs OR-68 (2,971 acres), OR-69 (9,482 acres), and CHU OR-70 (9,157 acres).

OR-68 is located on the Siskiyou National Forest. Eighty-six percent of this CHU is located within the Fish Hook/Galice LSR. This CHU provides a narrow band of suitable habitat which serves to connect OR-67 and OR-69 (Tweten 1992). A portion of the 2002 Biscuit Fire occurred in the extreme southeastern portion of this CHU; 2,971 acres of spotted owl NRF was lost. Post-fire, 41 percent (5,522 acres) of this CHU is still NRF and Figure 2 shows that except for two sections, the entire CHU is currently above 60 percent dispersal or better habitat. The current amount of spotted owl habitat (5,522 acres) and the good condition of dispersal habitat within this CHU should continue to provide for spotted owl NRF and for good connectivity between the two adjacent CHUs; this CHU should continue to function as intended.

OR-69 is located on the Siskiyou National Forest. Ninety-one percent of this CHU is located within the Fish Hook/Galice LSR. This unit provides the single link through the northwest portion of the Klamath Mountains Province leading to the Coast Ranges Province. This unit provides a link for north-south movement of owls between units OR-71, OR-67, OR-65, and OR-68. This unit also adjoins the northern end of the Kalmiopsis Wilderness, which currently supports little suitable owl habitat. The 2002 Biscuit Fire encompassed much of this CHU; 9,482 acres of suitable habitat for spotted owl was lost in the fire, of the 12,447 acres that existed pre-fire. There are currently 2,965 acres of spotted owl NRF left in this CHU and it will likely continue to provide habitat for spotted owls. In addition, the current mapping of dispersal or better habitat shows that while this CHU lost both dispersal and NRF in the southeastern portion of this CHU was lost, its connection with CHU OR-69 has not been compromised and there continues to be a solid link to CHU OR-71. The area immediately between this CHU and CHU OR-70 currently has less than 40 percent dispersal available in two sections but it is likely that

spotted owls will continue to be able to disperse across this area. It is likely that this CHU will continue to function as intended by providing a dispersal link between adjacent CHUs and should provide for north-south movement of spotted owls in the coast range (Figure 2).

OR-70 is located on the Siskiyou National Forest. Seventy-six percent of this CHU is located within the Briggs and West IV LSRs. This unit provides the only link between CHUs OR-69 and OR-72. The Siskiyou National Forest and the Medford District BLM have identified the Highway 199 corridor between CHUs OR-70 and OR-72 as an Area of Concern due to the geology, ownership and past management practices (SW OR LSR Assessment, USDA Siskiyou National Forest/USDI Medford District Bureau of Land Management.1995). This unit also adjoins the eastern boundary of the Kalmiopsis Wilderness. The 2002 Biscuit Fire encompassed much of the western portion of this CHU; 9,157 acres of the 17,623 NRF acres that existed pre-fire was lost. Post-fire, 8,466 acres of NRF exists, and the dispersal mapping (Figure 2) shows that except for two sections within the CHU, all sections within the CHU currently contain at least 60 percent in dispersal or better condition. In addition, the remaining NRF should continue to provide habitat for spotted owls, although at a reduced capacity compared with pre-fire conditions. Thus, this CHU should continue to provide a link between CHUs or-69 and OR-72 as well as NRF for spotted owls.

Two other CHUs suffered significant losses of habitat due to fires. OR-34 is located on the Medford District BLM and Rogue River NF. Seventy-four percent of the unit is within the Elk Creek and Lookout Mt/Black Butte LSRs. This unit was designated to maintain the essential nesting, roosting, foraging, and dispersal habitats found in this region of high fragmentation, due primarily because of land ownership patterns (Tweten 1992). This CHU provides north-south and east-west linkage from the Klamath/Siskiyou to the Western Cascades Provinces. The 2002 Timber Rock Fire occurred in this CHU; 1,216 acres (5 percent) of suitable habitat for spotted owls was lost. However, the remaining 21,022 acres of NRF occurs largely in large blocks in the northern portion of the CHU and there is still extant NRF and spotted owls within the fire area as evidenced by recent surveys by the BLM and Boise Cascade (Jim Harper pers. comm.). This remaining NRF should continue to provide for essential spotted owl habitat within the CHU. In addition, Figure 2 shows that there is available dispersal habitat within most federal sections of at least 60 percent or better along both the northern and western portion of the CHU which should continue to provide dispersal opportunities in a northeast southwest direction across this CHU and along the Rogue/Umpqua divide.

FSEIS Baseline 1994 information				Acres and percentages below are suitable (NRF) habitat % and changes compared to *FSEIS Baseline Suitable acres						
CHU #	Total acres in CHU	Percent of CHU that's LSR	*FSEIS Baseline Suitable (NRF)*	NRF lost to Fires since 1996	Fire % chg	NRF Lost to Timber	Timber % chg	Current CHU NRF baseline	Total % chg	Fire Names
CA-15	63,039	60,517 (96%)	18,397	0	0.0%	0	0.0%	18,397	0.0%	
OR-30	70,425	5,893 (68%)	39,839	0	0.0%	0	0.0%	39,839	0.0%	
OR-32	68,873	25,453 (37%)	35,653	0	0.0%	380	2.0%	35,273	1.0%	
OR-34	46,733	34,410 (74%)	23,281	1,216	5.0%	1,043	4.0%	21,022	9.0%	Timbered Rock
OR-35	68,895	52,031 (76%)	27,066	0	0.0%	471	2.0%	26,595	2.0%	
OR-36	7,080	None	3,992	0	0.0%	977	24.0%	3,015	25.0%	
OR-37	86,484	70,450 (81%)	50,748	0	0.0%	1,956	4.0%	48,792	4.0%	
OR-38	41,511	21,665 (52%)	13,950	0	0.0%	39	0.0%	13,911	0.0%	
OR-62	49,562	None	24,470	0	0.0%	240	0.9%	24,230	0.9%	
OR-64	7,538	None	3,833		0.0%	66	2.0%	3,767	2.0%	
OR-65	74,664	49,064 (66%)	55,578	1,642	3.0%	1,303	2.0%	52,633	5.0%	Biscuit
OR-66	8,384	8,384 (100%)	4,939	0	0.0%	0	0.0%	4,939	0.0%	
OR-67	98,238	66,440 (68%)	50,316	0	0.0%	704	1.0%	49,612	1.0%	
OR-68	13,382	11,547 (86%)	8,493	2,971	35.0%	0	0.0%	5,522	35.0%	Biscuit
OR-69	26,616	24,247 (91%)	12,447	9,482	76.0%	0	0.0%	2,965	76.0%	Biscuit
OR-70	36,943	27,770 (75%)	17,623	9,157	52.0%	0	0.0%	8,466	52.0%	Biscuit
OR-71	53,784	51,082 (95%)	16,994	521	3.0%	0	0.0%	16,473	3.0%	Biscuit, Repeater
OR-72	53,380	47,681 (89%)	29,005	0	0.0%	590	2.0%	28,415	2.0%	
OR-73	12,330	10,575 (86%)	6,276	0	0.0%	0	0.0%	6,274	0.0%	
OR-74	25,231	1,160 (5%)	13,553	0	0.0%	781	6.0%	12,772	6.0%	
OR-75	19,365	None	5,809	340	6.0%	455	8.0%	5,014	14.0%	Quartz, Sterling
OR-76	33,058	20,832 (63%)	22,642	0	0.0%	0	0.0%	22,642	0.0%	
Total	913,954	528,737(63%)	484,904	25,329	8.0%	9,005	2.5%	450,568	11.0%	

*SOURCE: G. Mayfield, FWS, pers. comm, 2001. Spatial data were overlaid based on FSEIS data (USDA and USDI 1993,1994) for Land Allocations, Northern spotted owl habitat, LSRs, ownership and FWS data for CHU boundaries (FWS 1994) to produce these data
 2-Reported percentages of NRF are not the total CHU acreage but are "cut" to the action area. Many CHUs extend outside the SW Oregon Administrative units

The Quartz Fire reduced 340 acres of NRF within CHU OR-75. This is a relatively small CHU, which is located on the Medford District BLM and the Rogue River National Forest. According to Tweten (1992), this unit was designated to maintain adequate distribution of nesting, roosting, and foraging habitat and improve the connectivity between CHUs in a region of high fragmentation; due in part to checkerboard ownership and natural and human-caused habitat removal. It also reduces the distance between OR-74 and OR-76. The 2001 Quartz Fire occurred in the northern portion of this CHU; 340 acres (six percent of this CHUs NRF) of spotted owl NRF was lost in the fire. The remaining 5,014 acres of NRF is distributed in relatively large blocks in both the northern and southeastern portions of this CHU and will likely continue to provide habitat for spotted owls. In addition, except for an area in the middle of the

CHU that consists of lowland oak woodlands and south facing brushfields that will likely never provide dispersal habitat, the remaining portions of the CHU to the north and south are providing at least 60 percent or higher dispersal habitat within each section within the CHU (Figure 2). This dispersal habitat within the CHU should continue to provide for dispersal across this CHU and it should continue to function as intended.

In the SW Oregon administrative units since 1994, 6,398 acres of CHU NRF have been degraded through timber harvest. Because degraded NRF retains its function as nesting roosting and foraging habitat, these impacts should not be detrimental to spotted owl dispersal and connectivity within and between the provinces. Although these CHUs may be less able to support spotted owl nesting, they likely still provide high quality dispersal habitat (Figure 2).

Six CHUs have not experienced any loss of spotted owl habitat since 1994, and ten have not had any NRF degraded through management activities since 1994. CHU overlap with LSR averages 63 percent; four CHUs have no LSR overlap, including OR-75, OR-62, OR-64, and OR-36, while OR-66 completely overlaps with LSR.

As stated previously, most of the CHUs in the SW Oregon administrative units and the Rogue Basin were identified for their contribution to connectivity across the landscape as well as their contribution to nesting, roosting and foraging habitat. Some CHUs (OR-38) were identified for their important contribution to connectivity in areas where federal land or quality habitat were lacking, while others (OR-71 and OR-35) were designated in part to ensure a range-wide distribution of spotted owls (Tweten 1992). The fires of 2002 have disproportionately affected some CHUs within the Basin including some rather severe effects to three CHUs within the perimeter of the Biscuit Fire (CHUs OR-68, 69, and 70). These CHUs have had significant losses and their functions may be somewhat impaired. However, the amount and distribution of suitable habitat currently existing within these CHUs should continue to provide NRF for clusters of spotted owls. Only eight percent of the extant NRF within the Rogue and South Coast Basin CHU network was affected overall by the fires and approximately 450,000 acres of NRF remain within CHUs in the action area. While no target amounts of NRF were identified for critical habitat within the SW Oregon administrative units, the 450,000 acres of NRF within the 23 CHUs that comprise the CHU system in the Rogue and South Coast Basins should still continue to provide high quality habitat for spotted owls within the action area and the function of this CHU system to provide NRF has not been precluded by either the fires or past timber harvest. In addition, Figure 2 shows the amount of dispersal or better habitat within and adjacent to the CHUs within the action area and based on the 50-11-40 assumption, this map indicates that there is currently enough dispersal or better habitat within CHUs and in a distribution that should facilitate spotted owl movement through and between each CHU. Therefore, even with the loss of eleven percent of the available NRF from CHUs in the action area from both fires and timber harvest since 1996, the critical habitat network in the Rogue and South Coast basins are currently functioning as intended. The amount and distribution of dispersal habitat currently existing within these CHUs should allow for movement of spotted owls through and between these CHUs and important inter- and intra-provincial links provided by these CHUs should still be functioning.

Murrelet

Currently an estimated 281,824 acres of murrelet habitat are within the range of the species in

the action area (which includes federal lands within 50 miles of the ocean). In the last two years, 424 acres (0.1 percent) of murrelet habitat were lost due to timber sales and 37,089 acres (12 percent) were lost due to fires, primarily the Biscuit Fire of 2002. In 1996, staff from the SNF and BLM analyzed murrelet occurrence data for southwest Oregon based on the distance inland of over 9,400 surveys. This review led to a proposed modification of the boundaries for the murrelet survey zones that would split Survey Zone 1 (from the coast to 35 miles inland) into three “areas” (A, B and C); Survey Zone 2 (35-50 miles inland) was termed Area D. The eastern boundary for Area A would coincide with the boundary between the western hemlock/tanoak and mixed conifer/mixed evergreen vegetation zones, and the eastern boundary for Area B would be 6.5 miles (10 kilometers) east of the Area A boundary. It was proposed that no surveys be required inland beyond Area B. This proposal was reviewed by the Forest Service Regional Office, BLM State Office, and the Service’s Oregon Fish and Wildlife Office. A statistical analysis of existing survey data was conducted, and it was deemed necessary to select a series of random plots in Areas C and D, and survey them for the presence of marbled murrelet. Surveys of the random plots were completed in 2000; the report is Appendix M of the FY 01-03 Biological Assessment (USDA FS and USDI FWS 2001). The final report has been approved, and the Service has agreed to eliminate the area east of proposed Area B from further murrelet survey requirements. Appendix M of the 2001 Assessment (USDA and USDI 2001) contains a complete and detailed discussion of this study and its results.

Within the defined range of the murrelet in southwest Oregon (Area A), an estimated 75,824 acres of late/climax seral stage forest occur. Approximately 88 percent occurs within land allocations with no programmed timber harvest (*e.g.* LSRs, Wilderness). Similarly, in Area B an estimated 43,407 acres of late/climax forest occur, with approximately 98 percent in land allocations with no programmed timber harvest. The Biscuit Fire burned approximately 1,600 acres of habitat in 2002. Within Area A, from 1988 through 2001, murrelets were detected during 712 surveys. Seven surveys in Area B resulted in detections (within a maximum 0.78 miles of the A/B border – the outcomes of six of these surveys were “undetermined,” and one was “fly through canopy,” or “occupancy”). One “undetermined” detection occurred in Area C. Of these 712 surveys, 221 (through year 2001) resulted in a determination of “occupancy” (verification of occupied stand).

Murrelet Critical Habitat

Critical habitat for the murrelet is present on the Siskiyou National Forest and Medford BLM Glendale RA. Where critical habitat is designated, it coincides with the LSR land allocation. Portions of the existing South Chetco, North Chetco, and Northwest Coast LSRs owe their existence to the presence of existing occupied Marbled Murrelet Sites (NWFP ROD, page C-10). The ROD also provides direction to protect all contiguous existing and recruitment habitat within 0.5 miles of any newly discovered occupied site (a circle of 0.5 mile radius contains 500 acres). These protected areas then become new LSRs. Critical habitat for marbled murrelet within the action area is approximately 421,000 acres, with 96,219 acres within the perimeter of the Biscuit Fire; 20,341 acres of critical habitat are actually within the known range of the marbled murrelet in SW Oregon (Area A), and within the fire perimeter. Only a small portion of this critical habitat is actually nesting habitat and within the known range (3,083 acres). Approximately 1,600 acres of habitat in designated critical habitat within zone A of the known range was lost in

the Biscuit Fire. An additional 7,000 acres of critical habitat within the Section 7 Watersheds covered by this Opinion are managed by the Coos Bay District BLM.

Vernal Pool Fairy Shrimp

Within the Rogue Basin, a large cluster of vernal pools on the Agate Desert area near White City, another complex of pools near Medford and other pool complexes on both Upper and Lower Table Rocks just north of the Rogue River managed by the BLM, support populations of vernal pool fairy shrimp. The extent of these pool complexes is approximately eight to nine thousand acres. It is unknown how many of the vernal pools support fairy shrimp; however, in two survey recent efforts in 1997-98 and in 2001 shrimp were found in various locations within the pool complexes. In 1997-98, 51 pools in nine locations representing four pool complexes in the Agate Desert and on Upper Table Rock were sampled and the shrimp were found at 12 (23 percent) of the pools (Helm and Fields 1998)). Surveys of 157 pools in the Agate Desert conducted by Evans and Associates (2001) found fairy shrimp in 41 (26 percent) of the pools. The Service recently (August 6 2003) designated critical habitat for the fairy shrimp, three other crustaceans and eleven species of vernal associated plants in California and Oregon (Federal Register Vol. 68, number 151). The final rule designated 1,184,513 acres of critical habitat throughout the range of the species of which approximately 7,500 acres are within the Rogue Basin. Of this 7,500 acres critical habitat in Oregon, the BLM manages approximately 344 acres on both Upper and Lower Table Rocks. Threats to the critical habitat on Table Rocks are largely restricted to recreation impacts from hikers walking through pools and the associated potential mortality to shrimp. In addition, a cattle grazing allotment of 180 acres is located on Upper Table Rock. The potential for direct mortality to shrimp from cattle grazing is a concern on Table Rocks; however cattle normally are not let out (April 15) to graze until the shrimp have completed their reproductive phase and are in the cyst stage which likely reduces the potential for this to occur.

V. Effects of the Action

Spotted Owl

Impacts from Tree Harvest

Tree harvest can result in the removal of a few trees within a stand or can result in removal of the majority of trees within the project area. Openings may occur in an even or patchy distribution, depending on objectives of the treatment and constraints of the land use allocation. Trees are harvested by individual sawyers, or crews of people with chain saws or machine-mounted saws. Harvest includes the layout, marking, falling, limbing, yarding, and decking the trees to be removed from the site. In all cases but biomass removal, the limbs and needles/branches remain within the project area, and the bole of the harvested tree is removed. Trees are hauled to landings by cable, heavy equipment, or helicopters. Trees are removed from decks or landings by logging trucks or helicopters. Access to the timber sale involves the use of existing roads in areas where roads already occur, and can also involve the design and development of new roads. New roads involve cutting trees from the road prism, occasional blasting, grading, hauling gravel, cutting into side banks, installing culverts and waterbars, and stabilizing adjacent areas.

The proposed action would remove or downgrade 31,621 acres of spotted owl habitat within the RRNF, SNF and Medford BLM over five fiscal years (Table 8) and is likely to adversely affect the spotted owl by reducing numbers, reproduction and forage opportunities for the spotted owl. This would be a reduction of four percent of the existing spotted owl habitat within the action area and 10 percent of the 304,274 acres unreserved spotted owl habitat acres within the action area. This amount of harvest through FY 08 would equate to a decadal rate of harvest of 63,242 acres, or eight percent, of the total amount of spotted owl habitat within the action area and 20 percent of the unreserved (not in Riparian Reserve, LSR, CWA) spotted owl habitat within the action area.

At 20 percent loss per decade (which equals 2 percent loss per year) of unreserved spotted owl habitat within the action area, all unreserved spotted owl habitat would be removed within approximately 50 years. The amount of unreserved spotted owl habitat reported by the FSEIS, however, does not include those acres that are in Riparian Reserves, 100-acre LSRs or that would be covered under the 15 percent Late-Successional/Old Growth retention S&G.

Therefore, the amount of unreserved NRF is likely to be somewhat less than 304,274 acres (Table 6) making the rate of actual harvest of unreserved NRF somewhat greater. However, of the proposed 31,621 acres of NRF downgraded or removed, only 33 percent (10,514 acres) is habitat removal, 67 percent (21,108 acres) is of an intermediate type of timber harvest that will downgrade NRF. This latter type of harvest should soon grow back into a closed canopy condition and into suitable NRF within 10 to 20 years.

In addition, there may be significant amount of salvage that will occur in both the Biscuit and Timbered Rock Fires. This salvage is generally limited to completely burned stands larger than ten acres and is not considered to be NRF post-fire. The salvage of this non habitat should have little effect on spotted owls as there is little to no canopy closure, no live trees, and likely a much reduced prey population, at least in the short term. However, it is largely unknown how spotted owls respond to fire and there may be some potential for adverse impacts to spotted owls due to disturbance or effects to spotted owls potentially using these burned areas or areas immediately adjacent to the burned areas. Specifically, there is a research project proposed within the

Timbered Rock Fire perimeter that will study the role of standing and down large wood levels on neotropical migratory bird populations and up to 100 acres of the proposed treatment units may occur within or adjacent to historic spotted nest sites that were burned in the fire. The Service believes that while these acres are completely burned and not currently considered habitat, there is some potential for owls to be associated with or near to these research plots and this research project will may affect and is likely to adversely affect the spotted owl. This adverse affect could result in the potential loss of forage and/or nesting habitat if the owls that had been using this habitat before the fire return these sites and this loss could result in the injury or death of those spotted owls.

Since the NWFP, the SW Oregon administrative unit=s proportion of all potential habitat loss or downgrading in the Matrix and AMA is about 14 percent of the range-wide total of 187,000 acres of Matrix and AMA NRF removed. These administrative units also contain about 14 percent of the range-wide Matrix and AMA which means that the SW Oregon administrative units within the Rogue basin have implemented roughly their portion of the rangewide habitat removal that was estimated to occur during the first decade of the NWFP. The NWFP (USDA and USDI 1994a; pg 46) stated that approximately two and one-half percent of the extant amount of spotted owl habitat likely will be harvested per decade. Since 1994, approximately 187,000 acres (162, 870 acres due to timber harvest), of spotted owl habitat have been removed, downgraded or have been consulted on and are anticipated to be removed or downgraded without further consultation. These acres represent less than 2.5 percent of the range-wide total acres of spotted owl habitat (Table 4). The removal of the 31,621 acres of spotted owl habitat evaluated in this Opinion would bring that total to 3 percent, or 216,621 acres, of the range-wide total acres of spotted owl habitat. However, only 3,000 acres are proposed by the SW Oregon administrative units for harvest under the proposed action before the decade ends in April 2004 which would not exceed the 2.5 percent of decadal habitat loss estimated in the NWFP. In addition, the SW Oregon administrative units did not harvest the entire amount of NRF anticipated in the FY01-03 biological opinion and 11,213 acres of NRF will be returned to the action area baseline. The proposed action is, therefore, consistent with this expectation of the NWFP and the Service=s biological opinion on the NWFP (USDI 1994).

Overall, for the three administrative units, the FY 04-08 timber sale programs could affect an estimated total of 50,327 and 19,791 acres of spotted owl NRF and dispersal habitat, respectively (Table 8). Suitable spotted owl habitat may be removed (10,514 acres), downgraded to dispersal habitat (21,113 acres) or degraded on 18,706 of these acres, while other sale acres may not currently be suitable. Downgraded acres may regain suitable spotted owl characteristics within several decades.

The NWFP assumed that, in addition to providing the primary areas for timber production, Matrix and AMA lands were needed to provide at least some NRF for spotted owl over the short term until the LSRs that might not be fully functional grew more late-successional habitat. The proposed loss and downgrading of 30,484 acres NRF within the Matrix and AMA land allocations could affect spotted owl numbers and reproduction as well as foraging opportunities by reducing available NRF for over 350 historic owls known to occur within those land allocations within the action area as of 1996. However, this constitutes approximately only ten percent of the total extant NRF within unreserved land allocations and over 273,000 acres of NRF will still be available for the extant spotted owls with in those unreserved land allocations.

In addition, over two thirds (21,113 acres) of the proposed habitat alteration would be downgrading of NRF that would likely return to fully suitable NRF within the next 20 years. Habitat removal under the proposed action roughly equals a decadal cut of 6 percent, at this rate of harvest it would take approximately 100 years to remove all NRF within unreserved land allocations. The Service believes that it is likely the Matrix and AMA land allocations will continue to provide sufficient NRF for spotted owls for at least the next several decades given that a large portion of the habitat alteration would be downgrading of NRF and the relatively low percentage of habitat removal per decade.

Table 8. FY 04-08 Spotted Owl NRF Habitat Effects by Administrative Unit.

Admin Unit	Spotted owl suitable habitat ^{1/}			Spotted owl dispersal ^{1/}		
		Remove	Dwngrd	Degrade	Remove	Degrade
Medford BLM	ASH	2,594	4,532	501	637	1,626
	BF	2,173	2,550	75	400	899
	GP	0	5,520	4,400	300	2,250
	GL	1,496	2,689	2,990	0	0
Subtotal	6,263	15,291	7,966	1,337	4,775	
ROR/SIS	APP	400	400	400	1,200	0
	PROS	318	580	3,786	879	7,393
	IV/GAL	600	1121	555	208	1,661
	CHETCO	969	1415	4,389	898	144
	PWRS	178	158	1,561	15	707
	GB	1,780	2148	40	574	0
Subtotal	4,245	5,822	10,761	3,774	9,905	
Total	10,514	21,113	18,706	5,111	14,680	

1. Acres from FS/BLM Level 1 Team spreadsheet

The removal of NRF can adversely affect spotted owls in numerous ways. NRF removal may occur within a known spotted owl home range, in unsurveyed habitat that may or may not be within a known spotted owl home range, or, if surveys are current, in unoccupied habitat. The most benign impact would be timber harvest in unoccupied habitat, although there are very few locations (if any) that have recent protocol surveys that have determined that the area is unoccupied. In these instances, where the SW Oregon administrative units have conducted protocol surveys, the Service believes that the loss of habitat would preclude future spotted owl occupancy which is likely to adversely affect the species as a whole, although no immediate loss or injury to an individual spotted owl would be anticipated, as the habitat would be at the time, unoccupied.

In the absence of data on spotted owl occupancy, the Service must make assumptions on the presence of the species in unsurveyed habitat. The Service assumes unsurveyed spotted owl habitat is occupied absent data to the contrary. The BLM, Forest Service, and the Service determined that landscape scale and project-specific spotted owl surveys were no longer necessary with the implementation of the NWFP, the establishment of large LSRs to provide clusters of breeding spotted owls and guidelines for Matrix lands to provide for dispersal between those LSRs, as well as the implementation of broad scale demographic studies across the range of the owl. As a consequence, the agencies have little information on specific locations of spotted owl activity centers. However, at the time of the implementation of the NWFP, there were 819 known spotted owls sites well distributed within the action area. Many of the home

ranges of the sites overlapped in the action area and while some may not be currently occupied, it is likely that many of these sites are still extant, in particular the LSR sites (>400 sites) where except for the recent fires, little to no habitat alteration has occurred. Also, with the human and fire induced reductions of spotted owl habitat over time, spotted owls may have been forced to find nest sites closer to other spotted owls than historically occurred. Home range sizes vary geographically and in many areas overlap with each other. As habitat is harvested and the amount of available spotted owl habitat declines, spotted owl home ranges will likely squeeze more closely together making a greater proportion of the extant habitat more likely to be part of a spotted owl home range. In addition, personal experience on the Applegate Ranger District and several other nearby Ranger Districts showed a large amount of overlap of spotted owl home ranges and that if there was spotted owl habitat available spotted owls were usually present. In SW Oregon and the Klamath range in particular, the extant habitat is naturally fragmented and it is therefore likely that any available habitat is being used by spotted owls. In addition, surveys in the South Cascade demographic area, in both Matrix and LSR land allocations, show that historic sites have been occupied at an annual average of 79 percent from 1992 to 2002, in 2002 LSR localities were occupied at slightly higher rates than Matrix lands (76 vs. 69 percent) (Anthony et al 2002). Based on this information, any removal of unsurveyed NRF is assumed by the Service to be occupied and to have an adverse affect and the Service assumes that this loss of NRF could significantly impair normal spotted owl behavioral patterns such as, breeding, feeding, and sheltering. This removal or downgrading of unsurveyed habitat may result in the potential death or injury to spotted owls.

Late-successional Reserves

The FY 04-08 timber harvest program for the SW Oregon administrative units anticipates removing or downgrading approximately 1,137 acres of NRF, degrading 8,700 acres of NRF within LSRs. The projects that would remove or degrade NRF are generally in the Northwest Coast LSR (#255) and designed to restore historically open meadow habitat that have experienced higher than normal levels of conifer encroachment during the last 80-100 years due to fire exclusion practices. It is likely that these stands, while they meet the definition of NRF, do not provide high quality habitat due to their location on the edges of these meadows and until recently did not ever grow to this type of habitat due to frequent fires that would maintain these meadows. The loss or downgrading of 1,137 acres of NRF in LSR #255 will remove one percent of the existing NRF and will likely have a minimal impact on the spotted owl due to the fact that while these portions of stands are generally at least 18 inches DBH and qualify as NRF, they have grown into this condition due to fire suppression in the last 70-80 years and generally are not high quality old growth habitat. These stands are also located within edge habitat which reduces their suitability for spotted owls.

Projects that degrade NRF in LSRs are also generally designed to open up stands that, while they may meet the minimum size standard for spotted owl habitat, but are generally single-storied and monotypic. In such cases, timber harvest is an effort to introduce complexity into the landscape and bring these stands forward sooner into higher quality late-successional condition than would occur naturally. These projects may have a short-term, negative impact on the quality of the spotted owl habitat in LSRs, but are designed to produce higher quality NRF more quickly than would be reached without treatment, given existing conditions. These projects must be consistent with REO direction including the tree thinning in LSRs memoranda (REO 1995; REO

1996a; REO 1996b). In addition, any project that removes, degrades or slows the development of spotted owl habitat within an LSR is reviewed, and approved, by the Level One team for consistency with this Opinion (and, therefore, with the NWFP) prior to its implementation, as proposed in the biological assessment (USDA and USDI 2003).

In addition to the removal of spotted owl NRF, 2,545 and 705 acres of spotted owl dispersal habitat may be degraded and removed in LSRs, respectively. These impacts are also designed to speed the development of spotted owl habitat, to reduce the potential for catastrophic fire, or to reduce encroachment within meadow habitat and also will be reviewed and accepted by the Level One team prior to implementation. The loss of 705 acres of spotted owl dispersal habitat occurs within two LSRs, with the majority (303 acres) occurring in LSR #255. Figure 1 shows that there is currently sufficient spotted owl dispersal habitat for spotted owls to travel through this portion of the action area. One hundred fifty acres of spotted owl dispersal habitat may be lost in the Fish Hook/Galice LSR (#258) which also has sufficient spotted owl dispersal capability (Figure 1).

Since the Service anticipates that the 2,048 acres of degraded dispersal habitat will still function as dispersal habitat post-harvest, we do not anticipate that the impact to the spotted owl from the degradation of these acres will adversely impact the local spotted owl population. The proposed projects will have very little negative impact on LSRs within the SW Oregon administrative units and will be reviewed prior to their implementation for consistency with this Opinion. The 1,137 acres of NRF loss only constitutes 0.3 percent of the total NRF located within all LSRs in the basin. In addition there are over 400 pairs of spotted owl within all LSRs that will experience no habitat loss from the proposed action. Consequently, the Service believes the proposed action will not impact the LSR system within the basin or any individual LSR to the extent that it would preclude the function of providing for large clusters of breeding spotted owls within these LSRs or across the landscape.

Connectivity

The proposed loss of 10,514 acres of NRF and the loss of 5,111 acres of spotted owl dispersal habitat proposed under the FY 04-08 timber harvest program could potentially have a negative impact on the ability of spotted owls to move across the landscape. This may impact the ability to move between LSRs and between physiographic provinces. Spotted owl movement across the landscape is dependent as much on the distribution of habitat as on the amount of habitat. Where federal land ownership is prevalent, both reserved and unreserved land-use allocations are expected to provide for spotted owl connectivity. As timber harvest removes more and more of the habitat that provides for spotted owl dispersal in the Matrix and AMA land-use allocations, the NWFP anticipated that spotted owl connectivity would be provided through other provisions, such as Forest Service 15 percent leave trees, BLM leave tree guidelines, 100-acre spotted owl cores, Riparian Reserves, and the 15 percent late-successional/old-growth retention guideline. The NWFP relied on these provisions based on an expectation of how these lands would be managed and how these provisions would be implemented (USFWS 1994).

The SW Oregon administrative units have developed a map of 14 Section 7 watersheds@ (Figure 1) that correlate closely with watershed sub-basins and have analyzed the timber harvest impacts relative to these watersheds (USDA and USDI 2001). The Service compared the proposed amount of lost NRF in each Section 7 watershed to the amount of extant NRF and dispersal or better habitat (Appendix C) and found that the proposed loss of NRF would be reasonably well-

distributed throughout the action area (Table 9). Thirteen of the 14 Section 7 watersheds have planned NRF and dispersal habitat removal during FYs 04-08, with a range of dispersal or better habitat loss from 0.3 percent (Coquille/Sixes watershed) to 2 percent (Rogue Middle and Chetco South). The median value is 1.6 percent. Given the assumption similar to the 50-11-40 rule, if at least 50 percent of a watershed is providing dispersal habitat and that habitat is well distributed within that watershed, then dispersal would not likely be precluded, and it is unlikely that the proposed action will impact dispersal within the action area to any great extent as no watershed would be reduced to below 50 percent dispersal capability.

Within the Little Butte watershed the proposed action may remove 280 acres of NRF and 25 acres of dispersal habitat, this is 0.6 percent of the watershed's dispersal or better habitat (Appendix C). This loss of 305 acres is in a watershed that includes some BLM checkerboard ownership and some contiguous Rogue River National Forest managed lands, and is an area that is not currently considered a spotted owl dispersal area of concern because the current dispersal map shows that there is sufficient dispersal habitat within the watershed (Figure 1). The proposed action would not significantly reduce the amount of available dispersal or better habitat and over 54,000 acres of dispersal habitat would remain within this watershed. The Service does not anticipate that this amount of harvest will preclude spotted owl dispersal along the west slope of the Cascades due to the current distribution of spotted owl habitat.

The proposed action may result in the removal 450 of NRF and 70 acres of dispersal habitat in the Cow-Upper watershed. This loss of NRF and dispersal habitat equals 1 percent of the watershed's extant dispersal or better habitat (Appendix C). The Cow-Upper watershed includes the Medford BLM portion of the Galesville area of dispersal concern (Tveten 1992, unpubl. lit.), but banding and telemetry data (Forsman et al., 2002) demonstrate that spotted owls are currently able to move across the I-5 corridor. Federally-managed land within the Galesville area of concern is in relatively good condition, but is checkerboarded with non-federal lands interspersed. This watershed includes CHUs OR-32, OR-62, OR-64 and OR-67. Given the data from Forsman et al. (2002), the fact that the proposed action will not reduce available dispersal habitat significantly and over 53,000 acres of dispersal will remain, the Service believes that the proposed action will not preclude spotted owl movement across this watershed.

The Applegate watershed may experience removal of 2,102 acres of NRF and the removal of 1,740 acres of dispersal habitat, which is 2 percent of the watershed's extant dispersal or better habitat (Appendix C). Of these acres, 1,287 may be lost in CHU OR-75, which is in the lower elevations of this watershed. The higher elevations are managed by the RRNF and consist of large blocks of contiguous forested habitat with some intermingled sections of non-federal land. The proposed action will not reduce spotted owl dispersal habitat to below 50 percent within the Applegate watershed and over 190,000 of dispersal or better habitat would remain which should allow for spotted owl dispersal throughout the watershed. The Service believes that, given the amount of proposed harvest, the remaining habitat within this watershed will continue to adequately provide for east-west spotted owl movement through the Siskiyou Crest area to connect the Coast and Cascade Range spotted owl populations.

The Rogue-Middle watershed may experience removal of 1,891 acres of NRF and 465 acres of dispersal removal, which is 2 percent of the watershed's extant dispersal or better habitat (Appendix C). This watershed is primarily lower elevation lands that have been heavily

harvested in the past. This watershed includes the Evans Creek area that has checkerboard ownership with federal and non-federal land and may be in relatively poor condition for spotted owl dispersal. However, dispersal analyses by the agencies show that the watershed is currently at 66 percent dispersal habitat and the Evans Creek subwatershed currently contains 46 percent dispersal habitat. The dispersal map also shows sufficient dispersal habitat at this time to facilitate dispersal (Figure 1), and this watershed will not be reduced to below 50 percent dispersal habitat by the proposed action. The proposed action would retain over 130,000 acres of dispersal habitat within this watershed and the proposed action is not expected to preclude spotted owl dispersal across the landscape.

The Rogue Lower Lobster watershed may experience removal of 635 acres of NRF and the removal of 154 acres of dispersal habitat, which is 1.6 percent of the watershed's dispersal or better habitat (Appendix C). This watershed contains 70 percent dispersal or better habitat and the proposed action will not reduce the watershed to below 50 percent. In addition, the dispersal map also shows sufficient dispersal habitat at this time to facilitate dispersal through out the watershed on federal lands (Figure 1). The Service believes that, given the amount of proposed harvest and the remaining dispersal habitat (46,000 acres), dispersal will not be precluded in the watershed and it will continue to adequately provide for spotted owl movement within the Coast range.

The Rogue Lower Wild watershed may experience removal of 753 acres of NRF and 170 of dispersal habitat removal, which is 0.6 percent of the watershed's dispersal or better habitat (Appendix C). This watershed contains 81 percent dispersal or better habitat and the proposed action will not reduce the watershed to below 50 percent. In addition, the dispersal map also shows sufficient dispersal habitat at this time to facilitate dispersal (Figure 1). The Service believes that, given the amount of proposed harvest and the remaining dispersal habitat (136,000 acres), dispersal will not be precluded in the watershed and it will continue to adequately provide for spotted owl movement within the Coast range and also provide for dispersal movements both to and from the Cascade and the Coast ranges.

Under the proposed action, the Chetco and South Coast watershed may have removal of 969 acres of NRF and 898 acres of dispersal habitat removal, which is 2 percent of the watershed's extant dispersal habitat (Appendix C). This watershed was impacted heavily by the Biscuit Fire but still contains 54 percent dispersal or better habitat and the proposed action will not reduce the watershed to below 50 percent. In addition, the dispersal map also shows sufficient dispersal habitat at this time to facilitate dispersal throughout the watershed (Figure 1). The Service believes that, given the amount of proposed harvest (1,867 acres) and the remaining amount of dispersal habitat (117,000 acres), the portion of this watershed managed by the Forest Service will continue to adequately provide the east-west spotted owl movement to connect the Coast and Siskiyou spotted owl populations

Table 9. Proposed FY 04/08 timber sale program spotted owl NRF and dispersal habitat modification of Section 7 watersheds by SW Oregon administrative units.

Section 7 Watersheds	Spotted owl NRF (acres)				Dispersal Habitat (Acres)	
	2003 BASELINE NRF <u>1/</u>	NRF Removed	Percentage NRF of each watershed Removed <u>2/</u>	Watershed NRF ACRES post harvest	Degraded (Still dispersal)	Removed
Applegate	94,950	2,108	2	92,842	1,782	1,740
Bear	26,317	347	1.3	25,970	302	70
Cow-Upper	30,924	450	1	30,474	0	0
Illinois	103,112	1,665	1	101,447	2488	575
Klamath	16,820	485	2	16,335	265	110
Little Butte	41,132	280	0.6	40,852	65	25
Rogue Lower Wild	111,092	753	3	110,339	0	170
Rogue Lower Lobster	32,280	635	2	31,635	0	154
Rogue Middle	69,975	1,891	0.5	68,084	1,495	465
Rogue Upper	208,200	771	2	207,429	7,532	889
Chetco and South	33,704	969		32,725	144	898
Coquille/Sixes	45,171	158	0.3	45,013	707	0
Elk River	26,304	178	0.6	26,126	0	15
Smith	6,186	0	0	6,186	0	0
Total, all watersheds	841,204	10,514	1.3	830,690	14,780	5,111

1/ Habitat lost to FY96 to 03 timber harvest and 1992-2002 fires used to generate current watershed baseline which does not use the FSEIS baseline

2/ Data derived by dividing amount downgraded/removed by total spotted owl habitat acres within each watershed (G. Mayfield, USFWS, pers. comm.) and multiplying by 100.

The Coquille/Sixes watershed, under the proposed action, may have the removal of up to 158 acres of NRF, which is 0.3 percent of the watersheds extant dispersal habitat (Appendix C). Dispersal analyses by the agencies show that the watershed is currently at 72 percent dispersal habitat on federal lands and the proposed action will reduce that by only 0.3 percent (Appendix C). In addition, the dispersal map also shows sufficient dispersal habitat at this time to facilitate dispersal (Figure 1), and this watershed will not be reduced to below 50 percent dispersal habitat by the proposed action. The proposed action is not expected to preclude spotted owl dispersal along the Coast Range within this or adjacent watersheds.

The Elk watershed may have the removal of 178 acres of NRF and 15 acres of dispersal habitat under the proposed action, which is 0.6 percent of the watersheds extant habitat. Dispersal analyses by the agencies show that the watershed is currently at 78 percent dispersal habitat on federal lands (Appendix C). In addition, the dispersal map also shows that there is sufficient dispersal habitat at this time to facilitate dispersal (Figure 1), and this watershed will not be reduced to below 50 percent dispersal habitat by the proposed action. The proposed action is not expected to preclude spotted owl dispersal along the Coast Range within this and adjacent watersheds.

The Illinois watershed may experience removal of 1,665 acres of NRF and 575 acres of dispersal, which is 1 percent of the watershed's extant dispersal or better habitat (Appendix C). The Biscuit Fire impacted this watershed heavily, but it still contains 57 percent dispersal or better habitat and the proposed action will not reduce the watershed to below 50 percent dispersal or better habitat. The Service believes that, given the amount of proposed harvest and the remaining dispersal habitat (208,000 acres), the portion of this watershed managed by the Forest Service does and will adequately provide the east-west spotted owl movement to connect the Coast and Siskiyou spotted owl populations.

Under the proposed action, The Bear watershed may experience removal of 347 acres of NRF and 70 acres of dispersal only habitat, which is 1.3 percent of the watersheds extant dispersal habitat (Appendix C). This watershed includes CHU OR-76, however, no timber harvest that removes or degrades spotted habitat or dispersal habitat will occur within the CHU. Dispersal analyses by the agencies show that the watershed is currently at 80 percent dispersal habitat on federal lands. In addition, the dispersal map also shows sufficient dispersal habitat at this time to facilitate dispersal across the Siskiyou Crest I-5 area of concern (Figure 2) and this watershed will not be reduced to below 50 percent dispersal habitat by the proposed action. The proposed action is not expected to preclude spotted owl dispersal from the Cascades to the Siskiyou in this area.

The Rogue Upper watershed may, under the proposed action, experience the removal of 771 acres of NRF and the removal 889 acres of dispersal habitat, which is 0.5 percent of the watersheds extant dispersal or better habitat (Appendix C). This watershed includes CHU OR-32, OR 33, OR-34, and OR 35; timber harvest would remove 190 acres of spotted owl habitat from CHU OR-34. Dispersal analyses by the agencies show that the watershed is currently at 70 percent dispersal habitat on federal lands and the proposed action may only reduce dispersal habitat by 1 percent. In addition, the dispersal map also shows sufficient dispersal habitat at this

time to facilitate dispersal along the south Cascades and west into the Galesville I-5 area of concern (Figure 1) and this watershed will not be reduced to below 50 percent dispersal habitat by the proposed action, 290,000 acres of dispersal habitat will remain in this watershed. The proposed action is not expected to preclude spotted owl dispersal from the Cascades to the Siskiyou and the Coast ranges in this area.

The Klamath watershed may experience removal of 485 acres of NRF and 110 acres of dispersal habitat, which is 2 percent of the watersheds extant habitat (Appendix C. Dispersal analyses by the agencies show that the watershed is currently at 77 percent dispersal habitat on Federal lands and the proposed action will only reduce dispersal habitat by 3 percent, there will be over 32,000 acres of dispersal habitat remaining in the watershed. In addition, the dispersal map also shows sufficient dispersal habitat at this time to facilitate dispersal across the Siskiyou Crest I-5 area of concern (Figure 1) and this watershed will not be reduced to below 50 percent dispersal habitat by the proposed action. The proposed action is not expected to preclude spotted owl dispersal from the Cascades to the Siskiyou in this area.

Even though the proposed harvests are well distributed across the action area, there are two locations where a single timber sale project could have a disproportionately large and adverse impact to spotted owl dispersal because of the condition and/or distribution of federal land. These two areas are the Cheney-Slate area of concern and the Mt. Ashland I-5 area of concern. Any removal of spotted owl dispersal or NRF in these two areas of concern need to be closely evaluated to determine the impact on the ability of spotted owls to disperse across the landscape, because the Service anticipates that any timber sales in these areas would involve the removal of NRF and dispersal habitat which could affect the ability of spotted owls to disperse across these two areas. As stated in the Assessment, all proposed timber sales will be designed and implemented in a manner that will not preclude dispersal of spotted owls between LSRs. In addition, no timber sales are planned for the Siskiyou I-5 area of concern and only one timber sale is proposed for the Cheney-Slate area of concern; this sale in the Grant Pass RA and the Applegate watershed would downgrade 500 acres of NRF. However this would not preclude the potential for dispersal across this area as there is currently sufficient dispersal habitat and the activity would not further reduce dispersal habitat (Figure 1).

Although the proposed actions will reduce the amount of available dispersal habitat in most of the watersheds within the action area, the Services' analyses does not find any watershed where spotted owl potential movement or dispersal would be impacted to a point where concern for owl movement at the landscape scale would occur. The Service therefore concludes that spotted owl dispersal across the landscape would be not be precluded by the proposed action.

Spotted Owl Critical Habitat

The current 2003 NRF baseline for all CHUs is 450, 568 acres; the proposed action is expected to impact 14,510 acres of spotted owl critical habitat in 12 different CHUs (Table 10). The proposed action includes 7,524 acres of NRF removed and downgraded, 3,402 acres of NRF degraded, 360 acres of dispersal habitat removed and 3,224 acres of dispersal habitat degraded. This loss and degradation of spotted owl NRF equals 1.7 and 0.8 percent, respectively, of the

total acres of spotted owl critical habitat within the SW Oregon administrative units. Only three CHUs may experience habitat loss or downgrading above 5 percent. OR- 71 may lose up to 6 percent (955 acres), OR-74 may lose up to 17 percent (2,247 acres), and OR-75 may lose up to 25 percent (1,287 acres) of the NRF within their respective boundaries. OR-74 and OR-75 are both located in the Applegate Section 7 watershed, primarily on BLM lands.

According to both the ESA, and FWS consultation handbook, adverse modification analysis must evaluate effects to critical habitat on the existence of the entire population of a species and determine whether or not the proposed action will affect the constituent elements of critical habitat to the extent the survival or recovery of the affected species would be appreciably reduced or diminished. In the case of the spotted owl, in order to maintain the integrity of the spotted owl critical habitat network both within the action area and throughout the entire critical habitat network, the effects of the proposed action cannot compromise the function of the CHU network to provide NRF for spotted owls as well as the capability of spotted owls to disperse across the provincial landscape within the SW Oregon administrative units.

The distribution of planned timber sale projects will have disproportionate impacts on CHUs throughout the action area, with the greatest impacts in CHU OR-75, which may lose (through removal and downgrading) 25 percent of the CHUs 5,014 extant spotted owl habitat acres. There will be 3,727 acres of NRF remaining in this CHU post harvest. OR-75 is located on the Medford District BLM and the Rogue River National Forest and no LSR allocation is located within this unit. The primary function, according to Tweten (1992) of this unit is to reduce the dispersal distance between OR-74 and OR-76 and along with OR-74; this unit provides for the east-west connection along the southern portion of the Klamath Mountains Province. Prior to the Quartz Fire, there were nine known spotted owl pairs within this CHU; one pair site was burned entirely in the Quartz fire. The loss of NRF will certainly diminish the ability of this CHU to provide NRF for spotted owls within the CHU, however, even if the proposed 1,287 acres of habitat were to be removed in one concentrated area of the CHU, the 3,727 acres of NRF remaining in this CHU should provide NRF for the remaining spotted owls as well as sufficient dispersal habitat within the CHU (Figure 2) to facilitate dispersal through this CHU and across the landscape. While the proposed action will adversely affect this CHU by NRF removal or downgrading, the Service believes that the proposed action will not preclude the function of this CHU as intended.

The proposed action may remove or downgrade up to 1 percent (520 acres) of the extant NRF from CHU OR-32. OR-32 is located on Medford and Roseburg Districts BLM and the Umpqua National Forest. Thirty-seven percent of the unit is within the Cow Creek LSR. This unit coincides with the Rogue-Umpqua Area of Concern, which provides an essential link in connecting the Western Cascades Province with the southern portion of the Coast Ranges and northern end of the Klamath Mountains Province. This unit provides the single link from the Western Cascades Province to the Klamath Mountains Province and associated Area of Concern. The land ownership patterns elevate the importance of maintaining areas of owl nesting habitat to link the Western Cascades, Coast Ranges, and the Klamath Mountains Provinces. There are 28 historical spotted owl pair sites known for this CHU. The remaining 34,753 acres of NRF

remaining in this CHU should provide sufficient NRF for the known spotted owls within the CHU and also continue to provide dispersal habitat for spotted owls in this important area that links the Cascades with the Coast Range and the Klamath Mountains. While there will be adverse effects to this CHU in the form of NRF loss or downgrading, the Service does not believe that the proposed action will preclude the ability of this CHU to function as intended.

The 0.8 percent of the extant NRF (190 acres) that is proposed to be removed from OR-34 affects a CHU that was impacted by the Timbered Rock Fire, approximately 1,198 acres was lost in this fire. OR-34 is located on the Medford District BLM and Rogue River NF. Seventy-four percent of the unit is within the Elk Creek and Lookout Mt/Black Butte LSRs. This unit was designated to maintain NRF and dispersal habitat in this area of high fragmentation, due primarily because of land ownership patterns. This CHU should continue to provide north-south and east-west linkage from the Klamath/Siskiyou to the Western Cascades Provinces. There are 21 historic spotted owl centers in this CHU. The remaining 20,832 acres of NRF remaining in this CHU should provide sufficient NRF for the known spotted owls within the CHU and also continue to provide dispersal habitat for spotted owls in both N-S and E-W directions. While there will be adverse effects to this CHU in the form of NRF loss or downgrading, the Service does not believe that the proposed action will preclude the ability of this CHU to function as intended.

Under the proposed action, CHU OR-37 may lose (through removal and downgrading) 620 acres of habitat (1.3 percent) of the 48,792 acres of current NRF. OR-37 extends from the Rogue Basin across the Cascades and into the Klamath basin and provides the single most important link connecting the Oregon Cascades Province to the Klamath Mountains Province across the south Ashland portion of the I-5 Area of Concern. By straddling the crest, this unit provides important east-west connectivity for the southern Oregon Cascades. This unit also provides the only link to the north in the Oregon Cascades, and is the key link from Oregon to California south of Highway 66. There are 35 historic spotted owl pair sites within this CHU. Since the NWFP, 1,956 acres of NRF have been removed from CHU OR-37. These 1,956 acres of lost NRF equal only 4 percent of the total NRF in the CHU. The 48,352 acres of NRF remaining in this CHU should provide sufficient NRF for the 35 known spotted owls as well as providing sufficient dispersal habitat within the CHU (Figure 2) in order to facilitate dispersal through this CHU and across the landscape. The Service does not believe that the proposed action will preclude the ability of this CHU to function because the remaining amount of habitat that will continue to provide sufficient NRF for the 35 known spotted owls as well as providing sufficient dispersal habitat within the CHU in order to facilitate dispersal through this CHU and across the landscape.

Under the proposed action, CHU OR-38 may lose (through removal and downgrading) 2.3 percent (318 acres) of the 13,911 acres of currently NRF. OR-38 is located on the Medford District BLM. Fifty-two percent of the unit is located within the Cascade-Siskiyou National Monument. This unit provides an important link between the Western Cascades and the Klamath Mountains Provinces and makes up the majority of the connection between the two Provinces across the Ashland portion of the I-5 Area of Concern. There are 17 historic spotted

owl pairs within this CHU. The 13,593 acres of NRF remaining in this CHU should provide sufficient NRF for spotted owls as well as sufficient dispersal habitat within the CHU (Figure 3) to facilitate dispersal through this CHU and across the landscape. The Service does not believe that the proposed action will preclude the ability of this CHU to function as intended.

The proposed action may remove or downgrade up to 1 percent (300 acres) of the extant NRF within CHU OR-62. OR-62 is located on the Roseburg and Medford District BLM. No LSR allocation is within this unit. This unit provides the link from the Klamath Mountains Province to the Coast Ranges Province, and establishes the link from those two Provinces through the Rogue-Umpqua portion of the I-5 Area of Concern. This unit was designated because of the current habitat conditions, land ownership patterns and past management practices. This unit includes not only areas where linkage between physiographic provinces are of concern, but also areas with known owl pairs within a region of relatively low abundance of suitable owl habitat. There are 7 historical spotted pair known for this CHU. The 23,930 acres of NRF remaining in this CHU should provide sufficient NRF for spotted owls as well as sufficient dispersal habitat within the CHU (Figure 3) to facilitate dispersal through this CHU and across the landscape. The Service does not believe that the proposed action will preclude the ability of this CHU to function as intended.

The proposed action may remove or downgrade up to 1.6 percent (867 acres) of CHU OR-65 extant NRF. OR-65 is located on the Medford District BLM and the Siskiyou National Forest. Sixty-six percent of this CHU is located within the Fish Hook/Galice LSR. This unit provides two inter-provincial links: from the Klamath Mountains Province to the Western Cascades Province, and from the Klamath Mountains Province north to the Coast Ranges Province. This unit provides a core area of suitable habitat to help augment the severely fragmented Rogue-Umpqua portion of the I-5 Area of Concern. There are 16 historic spotted owl pairs known for this CHU. A portion of the 2002 Biscuit Fire occurred in the SW corner of this CHU; 1,642 acres of suitable habitat for spotted owl was lost. . The 51,776 acres of NRF remaining in this CHU after the proposed action is implemented should provide sufficient NRF for many spotted owls as well as sufficient dispersal habitat within the CHU (Figure 3) to facilitate dispersal through this CHU and across the landscape. The Service does not believe that the proposed action will preclude the ability of this CHU to function as intended.

The proposed action may remove or downgrade up to 0.4 percent (176 acres) of the current NRF habitat located within CHU OR-67. According to Tweten (1992), OR-67 is located on the Medford District BLM and the Siskiyou National Forest. Sixty-eight percent of this CHU is located within the Northwest Coast and Fish Hook/Galice LSRs. This CHU provides a portion of the link from the Klamath Mountains Province to the southern end of the Oregon Coast Ranges Province. It helps support the western end of the Rogue-Umpqua portion of the I-5 Area of Concern which connects the southwest edge of the Oregon Cascades Province to the Klamath Mountains Province. Lands immediately north of this unit are non-federal and lack suitable owl habitat. This unit also encompasses the Wild Rogue Wilderness, which supports suitable habitat in its lower elevations. There are 26 historic spotted owl pairs known for this CHU. After the proposed action is implemented, there will be 49,436 acres of NRF remaining in this CHU. This remaining habitat should provide NRF for spotted owls within the CHU as well as sufficient

dispersal habitat within the CHU (Figure 2) in order to facilitate dispersal through this CHU and across the landscape. The Service does not believe that the proposed action will preclude the ability of this CHU to function as intended.

The 4 percent of the extant NRF (955 acres) that is proposed to be removed from OR-71 affects a CHU that was impacted by the Biscuit Fire, approximately 2,900 acres were lost in the fire. OR-71 is located entirely on the Siskiyou National Forest and ninety-five percent of this CHU is located within the South Chetco LSR. This unit provides the only north-south link within the Klamath Mountains Province to the California Coastal redwood zone. This unit adjoins the southwest portion of the Kalmiopsis Wilderness, and is the most westerly unit within the range of the spotted owl. There are 12 historic spotted owl centers in this CHU. The Service does not believe that the proposed action will preclude the ability of this CHU to function as intended because the remaining 15,518 acres of NRF located in this CHU should provide NRF for spotted owls as well as sufficient dispersal habitat within the CHU (Figure 2) in order to facilitate dispersal through this CHU and across the landscape.

CHU OR-74 may lose, by removal and downgrading, 17 percent (2,274 acres) of the CHUs 12,772 extant spotted owl NRF acres. There will be 10,498 acres of NRF remaining in this CHU post harvest. OR-74 is located on the Medford District BLM and the Siskiyou National Forest and five percent of the unit is located within the East IV/Williams LSR (LSR RO249). This unit along with OR-75 provides the east-west connection along the southern portion of the Klamath Mountains Province and 12 historic spotted owl pair sites are within this CHU. While the proposed action may reduce this CHUs ability to provide NRF for spotted owls, there will be 10,489 acres of NRF remaining in the CHU that will continue to provide NRF for the 12 known spotted owl sites. In addition, even if the proposed harvest were to occur in one concentrated area of the CHU, which is unlikely, the 10,498 acres of NRF located in this CHU should provide NRF for spotted owls as well as sufficient dispersal habitat within the CHU (Figure 2) to facilitate dispersal through this CHU and across the landscape. While there will be adverse effects to this CHU in the form of NRF loss or downgrading, the Service does not believe that the proposed action will preclude the ability of this CHU to function as intended.

CHU OR-64 is within the Galesville area of dispersal concern; there will be no impacts to this CHU and it will likely continue to function as intended in this area of concern.

OR-72 is the CHU, 84 % of which is also LSR, is directly adjacent to and partially included in, the Cheney-Slate area of concern. There will be no impacts to this CHU and it will likely continue to function as intended within the Cheney-Slate area of concern.

Table 10B Proposed FY 04/08 timber sale program spotted owl habitat modification of spotted owl CHUs by SW Oregon administrative units. Only those CHUs affected by timber harvest activities are shown here.

Critical Habitat Unit	Spotted owl CHU NRF acres					Dispersal Habitat (Acres)	
	2003 BASELINE CHU NRF ACRES	Downgraded Removed	Percentage NRF of each CHU Removed/Dwngrd 1/	CHU NRF ACRES post harvest	Degraded still suitable	Degraded (Still dispersal)	Removed
OR-32	5,273	520	1.0	34,753	0	0	0
OR-34	21,022	190	0.8	20,832	150	150	0
OR-35	26,595	0	0.0	26,595	1,200	1438	
OR-37	48,792	620	1.3	48,172	120	115	25
OR-38	13,911	318	2.3	13,593	57	81	34
OR-62	24,230	300	1.0	23,930	0	0	0
OR-65	52,633	867	1.6	51,766	371	0	0
OR-67	49,612	176	0.4	49,436	1,164	580	0
OR-68	5,522	44	0.8	5,478	0	0	0
OR-71	16,473	955	6.0	15,518			
OR-74	12,772	2,247	17.0	10,498	225	577	180
OR-75	5,014	1,287	25.0	3,727	115	283	121
Total	311,849	7,524	2.5	304,325	3,402	3,224	360

1/ Data derived by dividing amount downgraded/removed by total spotted owl habitat acres within each CHU (G. Mayfield, USFWS, pers. comm.) and multiplying by 100.

While most of the CHUs in the SW Oregon administrative units and the Rogue Basin were identified for their contribution to connectivity across the landscape, they are also to contribute to nesting, roosting and foraging habitat. The proposed action may disproportionately affect some CHUs within the Basin including some rather severe effects to three CHUs within the perimeter of the Biscuit Fire (CHUs OR-74 and 75). These CHUs may have somewhat significant losses of habitat from the proposed action and their functions may be somewhat impaired. However, the amount and distribution of NRF habitat currently existing within these CHUs should continue to provide NRF for clusters of spotted owls. Only 1.7 percent of the extant NRF within the Rogue and South Coast Basin CHU network has the potential to be affected by the proposed action and 442,724 acres of NRF will remain within CHUs in the action area. While no target amounts of NRF were identified for critical habitat within the SW Oregon administrative units, the 442,724 acres of NRF within the 23 CHUs that comprise the CHU system in the Rogue and South Coast Basins will continue to provide high quality habitat for spotted owls within the action area and the function this CHU system to provide habitat will not be precluded by the proposed action. In addition, Figure 2 shows the amount of dispersal or better habitat within and adjacent to the CHUs within the action area and based on the 50-11-40 assumption, this map indicates that there is currently enough dispersal or better habitat within CHUs and in a distribution that should facilitate spotted owl movement through and between each CHU. This will continue to be the case after the proposed action has been implemented. Therefore, the critical habitat network in the Rogue and South Coast basins are currently functioning as intended. The amount and distribution of dispersal habitat currently existing within these CHUs should allow for movement of spotted owls through and between these CHUs and important inter- and intra-provincial links provided by these CHUs should still be functioning.

The SW Oregon administrative units are situated largely within two adjacent physiographic provinces; the Oregon Klamath Mountains province and the Western Oregon Cascades province. The Service's baseline evaluation for the SW Oregon administrative units (USFWS 2001b) and the Rangewide Baseline Summary (USFWS 2001a) includes an analysis of the critical habitat networks within both of these physiographic provinces and concludes that both networks continue to contribute to spotted owl recovery by providing for spotted owl dispersal across and between both provinces, as well as between the other interconnected provinces throughout the range of the spotted owl. This analysis also considers the NRF removal and downgrading that has occurred since that time as well as the proposed action and has come to the same conclusion that the CHU network within the action area will still continue to function as intended.

Given the juxtaposition on the landscape, the current condition of the CHUs and anticipated NRF loss within CHUs the Service does not anticipate that the connectivity or NRF goals of the SW Oregon administrative units' critical habitat network will be precluded by the proposed action. The Service bases this conclusion on the amount of spotted owl habitat impacts, the remaining habitat in those impacted in those CHUs (Table 10) and the remaining NRF habitat throughout the CHU network within the action area. While the proposed action will affect the constituent elements of critical habitat, it is unlikely that the proposed action would appreciably reduce or diminish the survival or recovery of the spotted owl, both at the provincial and the range-wide level. The final rule for the designation of critical habitat for the spotted owl stated that adverse modification analysis should be based on impacts to CHUs at the provincial level and because the Service anticipates that the proposed action may somewhat impair the function of up to three CHUs but will not preclude the goals of any individual CHU within the action area from being met, the provincial critical habitat network will continue to function as intended and adverse modification of critical habitat is not anticipated by the Service at this time.

Disturbance

Noise disturbance of known spotted owls during the critical nesting period is not anticipated for timber sale and other activities that are near known activity centers or within LSRs because the terms and conditions in this Opinion and PDC of the proposed action prohibit such activity unless protocol surveys are conducted and the sites are found to be unoccupied or the pair is not nesting. Noise disturbance may disrupt normal spotted owl behavioral patterns during the critical nesting period if the harvest is near unsurveyed spotted owl habitat or if it is within a known home range but may be near an undetected activity center. Absent specific information to the contrary, the Service anticipates that disturbance of spotted owls may occur from many, if not all, of the acres of proposed harvest. Since home ranges vary across the spotted owl=s range from 1.2 to 2.2 miles in radius, assuming that a project is within a home range does not mean that the noise generated from that project will ever reach a spotted owl on a nest or moving through its home range. However, without current survey data, there is no reliable way to know whether a project is proximate to either a spotted owl nest or an adult spotted owl paired with a recently fledged juvenile. Therefore, unless there is site-specific data to the contrary, the Service assumes that the above-ambient noise generated by the proposed action may affect spotted owls within spotted owl habitat that is in the vicinity of that project. However, the Service also believes this is to a certain extent, an overestimation of the likelihood that spotted owls will be in the proximity of the proposed projects.

Noise above ambient levels may disturb adult or juvenile spotted owls and could cause them to flush from their nest site, could cause a juvenile to prematurely fledge or could interrupt foraging activity. While the effects of noise are not clear, any of these impacts could result in the reduced fitness or even death of an individual bird due to missed feedings, or reduced protection of the young if adults are disturbed

There has been little data regarding the impacts of noise on spotted owls and other listed species. However, the Service has recently analyzed the available data on spotted owls, murrelets and other species (USFWS 2003c; Appendix D), and has consulted species experts who have worked extensively with spotted owls to determine the extent to which above-ambient noises affect spotted owls. The results of this analysis indicate that spotted owls may flush from their nest or roost or may abort a feeding attempt of their young when the following activities occur up to the specified distances (Table 11). This data has been used by the Lacey Washington office of the Service in two biological opinions and it is the Service's current understanding of harassment distances based on the best available science. Consequently, it will be incorporated into this Opinion as current guidance for harassment distances for various activities as it relates to adverse effects to the spotted owl from harassment due to disturbance. If the Services' understanding of these distances change, adjustments to these distances may be recommended in the future.

Table 11. Harassment distances from various activities for spotted owls.

Type of Activity	Distance at which spotted owl may flush or abort a feeding attempt
a blast larger than 2 pounds of explosives	1 mile
a blast of 2 pounds or less	120 yards
an impact pile driver, a jackhammer, or a rock drill	60 yards
a helicopter or a single-engine airplane	120 yards
chainsaws (hazard trees, precommercial and commercial thinning)	65 yards
heavy equipment	35 yards

Above-ambient noises further than these Table 11 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 towards the noise, hiding, assuming a defensive stance, etc. (USFWS 2003).

Timing of Disturbance

The risk to spotted owls from noise disturbance is tied to the timing of the activity and is highest when adults are defending young or eggs in a nest or are feeding and protecting recently fledged juveniles. During this period, the separation of adults and their young could result in death or injury to the young as a result of predation. The leading known causes of mortality in juvenile spotted owls are starvation and predation by great horned owls (Miller 1989; USDI 1990a~listing document). The time period when adults or offspring are unable to move away from threats or noises is between the time that the eggs are laid and when the young can fly, which is generally about two weeks after the young fledge from the nest. After the young are able to fly, we assume that adults and young may move, but would stay together if annoyed by noise from the proposed action.

The timing of these development benchmarks (nesting and fledging) varies geographically, although spotted owls are generally believed to start laying their eggs around the beginning of March. In Oregon, data based on fledge dates indicate June 30th is the date by which almost all juveniles are capable of flight. This 1 March – 30 June period of vulnerability is called the “critical nesting period.”

Activities that may result in above-ambient noise levels include the use of mechanized tree harvest equipment, road hauling, aircraft/helicopters, heavy equipment, hydraulic hammers, blasting, and road construction and maintenance equipment. In some instances, noise levels produced by these activities can remain above ambient levels out to one mile (for blasting) and still affect spotted owls. If potentially disturbing activities are implemented during the spotted owl critical nesting season (March 1 – June 30) within the prescribed distances in Table 11 of occupied or unsurveyed spotted owl habitat, those activities may adversely affect spotted owls by causing adults to flush from their nest site, abandon a nest, or cause juveniles to prematurely fledge, interrupt foraging activity, or result in increased predation due to less protection when the

adult flushes. After June 30, it is presumed that most fledgling spotted owls are capable of sustained flight and can avoid harmful disturbances; thus, disturbance from proposed actions within the prescribed distances shown in Table 10 of known activity centers or unsurveyed suitable habitat, and between July 1 and September 30, may affect, but are not likely to adversely affect, spotted owls.

The SW Oregon administrative units typically utilize minimization measures to avoid adverse impacts to nesting spotted owls wherever they occur, but it is likely that some adverse impact may occur to owls due to disturbance in unsurveyed habitat within or adjacent to project areas. The SW Oregon administrative units and the Service, used an average of the new Service disturbance distances to assess the potential impacts associated with tree harvest activities (the average of disturbance distances associated with tree harvest = 100 yards - Table 10), they estimated 40 percent of an average zone of 300 feet around a standard project area (presumed to be 50 acres) would be NRF (as determined by the percentage of suitable habitat in the matrix according to the Environmental Baseline Tables in the Assessment). The disturbance resulting from the timber activities over the life of the Assessment was estimated to potentially affect spotted owls associated with approximately 25,000 acres of NRF.

The SW Oregon administrative units predict that up to 30 percent of the potential disturbance acres could possibly occur in or adjacent to unsurveyed spotted owl habitat (based on the percent of unprotected spotted owl habitat in the Action Area) during the critical breeding season. Disturbance could affect individual adult spotted owls or young such that their normal behavior, survival, and/or reproduction might be compromised. The Service anticipates that disturbance to one third of the 25,000 acres (8,500 acres) of spotted owl habitat could result in the disruption of these normal spotted owl behavioral patterns such as feeding, breeding, and shelter from noise disturbance from tree harvest and related activities. However, the SW Oregon administrative units will implement mandatory PDC to minimize adverse effects due to disturbance near known sites and in LSRs. In addition, 7 timber sales and three other projects (see Appendix A, Exceptions to PDC) on the Powers and Gold Beach Ranger Districts require an exception to the seasonal restriction PDC due to safety concerns, instream fish restrictions, or Port-Orford cedar root rot seasonal restrictions. These projects total 1,406 acres, are likely to disturb up to an additional; 500 acres of spotted owl habitat, and are likely to adversely affect the spotted owl due to harassment by disturbance during the critical nesting season. Therefore, a total of 9,000 acres are anticipated to be disturbed by timber sale related and other projects in the proposed action. Disturbance could affect individual adult spotted owls or young such that their normal behavior, survival, and/or reproduction might be compromised. The Service anticipates that disturbance to these 9,000 acres of spotted owl habitat could result in the disruption of these normal spotted owl behavioral patterns such as feeding, breeding, and shelter from noise disturbance from tree harvest and related activities.

Impacts from Activities other than Tree Harvest

There are 12 other activity types in the proposed action that have the potential to affect spotted owls either by habitat loss or degradation or disturbance. Some of these proposed activities will remove or downgrade spotted owl habitat and are likely to adversely affect the spotted owl. Total loss of spotted owl habitat will be no more than 100 acres total for all proposed activities. There is also some potential for harassment of spotted owls due to disturbance if these activities

were to occur in proximity to unsurveyed spotted owl habitat. Harassment to spotted owls due to disturbance is likely to adversely affect spotted owls. It is anticipated that no more than 500 acres of unsurveyed spotted owl habitat will be disturbed during the critical breeding season

Vegetation management includes non-commercial silvicultural activities consisting, but not limited to, stand density management, conversion, fertilization, pruning, pre-commercial thinning, Port-Orford-cedar sanitation, riparian thinning, animal damage control (gopher baiting), slash piling, and burning. Some habitat degradation along roads (within 75 feet) could result from Port-Orford Cedar sanitation due to the potential loss of suitable nest trees if they are infected, but habitat should remain suitable at the stand level. Potential loss of suitable nest trees along roads associated with Port-Orford cedar sanitation may affect and is likely to adversely affect the spotted owl due to habitat loss.

No habitat loss will result from any other of these activities but there may be harassment due to disturbance if some of these activities that produce noise above ambient levels were to occur during the critical breeding season. In particular, stand density management, stand conversion, pruning, pre-commercial thinning, Port-Orford-cedar sanitation, and riparian thinning might be conducted using chainsaws that produce noise above ambient noise levels. The PDC for all activities will ensure that known spotted owl sites will not be disturbed during the critical nesting season. However there may be some unsurveyed spotted owl habitat near these activities and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with vegetation management may affect and is likely to adversely affect the spotted owl due to harassment.

Gopher baiting would have no effect to spotted owls due to the 0.25 mile restriction to all baiting within 0.25 miles of a known owl site. In addition, it is unlikely that an owl would eat a poisoned rodent as the animals usually die underground and spotted owls do not hunt in recently regenerated areas where this technique is most often used.

Special forest products includes personal use firewood, cedar bough harvest, Christmas trees, Port-Orford-cedar arrow wood sales, mushroom harvest, brush and bear grass cuttings, medicinal plants, pole-size timber, burl and rock removal. There may be harassment due to disturbance if some of these activities that produce noise above ambient levels were to occur during the critical breeding season. In particular, burl removal, and firewood and pole size timber cutting employ the use of chainsaws that may produce noise above ambient noise levels; in addition, helicopters may be used to remove cedar bolts for arrow wood sales. . The PDC for all activities will ensure that known spotted owl sites will be not disturbed during the critical nesting season. However, there may be unsurveyed spotted owl habitat near some of these activities, and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with special forest products may affect and is likely to adversely affect the spotted owl due to harassment.

Watershed restoration projects includes culvert repair/replacement, road restoration or decommissioning, slope stabilization, habitat improvement projects, stream improvement projects, and these projects may include tree lining/felling, down wood, and snag creation. There may be harassment due to disturbance if some of these activities that produce noise above ambient levels were to occur during the critical breeding season. The PDC for all activities will

ensure known spotted owl sites will be not disturbed during the critical nesting season. However there may be some unsurveyed spotted owl habitat near these activities and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with watershed restoration may affect and is likely to adversely affect the spotted owl due to harassment.

Fuels management projects include slash piling and prescribed burning, thinning, and brush treatments. Some habitat degradation may occur with activities such as non-commercial thinning and maintenance. Activities associated with fuel management projects may affect but are not likely to adversely affect spotted owls due to the fact that no removal or downgrading of habitat will occur.

There may be harassment due to disturbance if some of these activities that produce noise above ambient levels were to occur during the critical breeding season. PDC for prescribed fire that restrict smoke into known owl sites during the critical nest season will minimize adverse effects and the PDC for all activities will ensure that known spotted owl sites will not be disturbed during the critical nesting season. However, there may be some unsurveyed spotted owl habitat near these activities and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with fuels management may affect and is likely to adversely affect the spotted owl due to harassment.

Recreation includes trail construction and maintenance, and development and maintenance of campgrounds and other facilities. A small amount of suitable habitat might be removed or degraded during campground renovations, or trail construction or reconstruction. Activities associated with recreation may affect and are likely to adversely affect the spotted owl due to habitat loss.

Use of chainsaws or other motorized equipment to construct trails or campgrounds could disturb nesting spotted owls or some other listed species in unsurveyed habitat on a short-term basis. Site-specific PDC for spotted owls would reduce impacts to known spotted owl sites; however, there may be some unsurveyed spotted owl habitat near these activities and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with recreation may affect and is likely to adversely affect the spotted owl due to harassment.

Road Maintenance/Construction includes maintenance, restoration or decommissioning, culvert replacement and repair, bridge maintenance and repair, and road re-alignment. Small amounts of dispersal or suitable habitat (isolated trees along roads) may be removed during projects, which could degrade habitat, although it would likely still continue to function as suitable habitat at the stand level. Potential loss of suitable nest trees along the road associated with road maintenance/construction may affect and is likely to adversely affect the spotted owl due to habitat loss.

Use of chainsaws or other motorized equipment during projects could disturb nesting spotted owls in unsurveyed spotted owl habitat. Site-specific PDC and seasonal restrictions for spotted owls would reduce impacts to known spotted owl sites; however, there may be some unsurveyed spotted owl habitat near these activities and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with road

maintenance/construction may affect and is likely to adversely affect the spotted owl due to harassment.

Road Use Permits are covered in this Opinion only for specific current applications for right-of-way agreements and road use permits across federal lands. There is one current application for a road use permit (RUP) included in the proposed action. The Rough and Ready RUP will remove 1.2 acres of spotted owl habitat during construction of a road to access their land. This habitat removal may affect and is likely to adversely affect the spotted owl due to habitat removal.

Other Special Use Authorizations (permits) include research collecting, commercial permits, group permits, cell towers, power-lines, utility corridors, and other utility facilities. Some removal or degradation of spotted owl habitat may occur, however less than ten acres of habitat is expected to be impacted over the life of the Opinion. Activities associated with special use permits and authorizations may affect and are likely to adversely affect the spotted owl due to habitat loss.

Use of chainsaws or other motorized equipment during projects could also disturb nesting spotted owls in unsurveyed habitat during the critical breeding season. Site-specific PDC for spotted owls would reduce impacts to known owl sites; however, there may be some unsurveyed spotted owl habitat near these activities and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with special use authorizations and permits may affect and is likely to adversely affect the spotted owl due to harassment.

Mining and Quarry Operations include casual use permits, notices of intent, and plan level permits and operations (60 over the life of the Opinion), plus commercial quarries (5 over the life of the Opinion), all on action agency lands. Some habitat removal could result from these proposed projects; the total amount of habitat removal is expected to be no more than 75 acres over the life of the plan. This habitat removal from the proposed mining operations may affect and is likely to adversely affect spotted owls.

In addition, the use of chainsaws or other motorized equipment as well as hauling of rock and blasting could also disturb nesting spotted owls in unsurveyed spotted owl habitat. Site-specific PDC such as restrictions on blasting within one mile of known sites would reduce impacts to known owl sites; however, there may be some unsurveyed spotted owl habitat near these activities and any owls associated with that habitat could be disturbed during the critical breeding season. Disturbance associated with mining and quarry operations may affect and is likely to adversely affect the spotted owl due to harassment.

Cultural resource projects include cemetery, bridge, and cabin restoration and archeological digs. It is unlikely that any habitat removal or downgrading would occur; however there may be some slight degradation of spotted owl habitat during project implementation. The use of chainsaws or heavy equipment, if used during such projects, could also disturb nesting spotted owls in unsurveyed spotted owl habitat. Site-specific PDC such as restriction within prescribed distances of known spotted owl sites, would reduce impacts to known sites; however, there may be unsurveyed spotted owl habitat near some of these activities and any owls associated with

that habitat could be disturbed during the critical breeding season. Activities associated with cultural resource projects could disturb spotted owls in unsurveyed suitable habitat during the critical breeding season, and therefore may affect and are likely to adversely affect the spotted owl due to harassment.

Effects of the Proposed Action on the Marbled Murrelet

The proposed action would remove 2,070 acres of suitable murrelet habitat within the known range of the murrelet in SW Oregon, and another 1,610 acres of suitable habitat in Area B, a 10km buffer to the known range. All habitat alteration will occur within the Siskiyou NF, the Powers RD may remove up to 24 acres of murrelet, the Chetco RD may remove up to 924 acres, and the Gold Beach RD may remove up to 2,732 acres of murrelet habitat, although only 1,122 acres will be within area A. This habitat removal is likely to adversely affect the murrelet. Of these 3,680 acres, 450 would be removed from the LSR land allocation. This removal would represent 5 percent of the extant murrelet habitat within Zones A and B and equal 1.4 percent of the 281,824 acres of extant murrelet habitat within the 50 mile limit of murrelet range in the basin. Any acres removed through traditional timber harvest activities will require surveys for two years and found to be unoccupied by nesting murrelets. If found occupied, these stands and any contiguous existing and recruitment habitat within 0.5 miles would become LSRs. Because no occupied nest stands would be removed, the effect of the loss of these suitable but unoccupied acres would be to preclude future nesting possibilities for murrelets. The SW Oregon administrative units have the option of foregoing surveys and assuming that suitable murrelet habitat is occupied. As described in the PDC (USDA and USDI 2003) a new, 0.5-mile radius LSR must be established (USDA and USDI 1994a; p. C-10) for any stand assumed to be occupied. The LSR must include all contiguous existing and recruitment habitat (USDA and USDI 1994a; p. C-10) and management of non-habitat within the 0.5-mile circle must protect or enhance the suitable or replacement habitat (USDA and USDI 1994a; p. C-12). Therefore, no timber harvest should occur within 0.5 miles of occupied or unsurveyed suitable murrelet habitat on federal land without designing the sale to benefit nesting murrelets.

It is the responsibility of the action agency to complete the two-year, Pacific Seabird Group (PSG) survey protocol (PSG 1998, Mack et al. 2003) which requires between ten and 18 surveys depending on intermediate results. The PSG survey protocol is designed to maximize the detection of nesting murrelets with an operationally reasonable amount of effort. Because of the requirement to survey all suitable murrelet habitat prior to timber harvest, it is unlikely that occupied stands will be removed.

Disturbance

Noise disturbance of known murrelets during the critical nesting period is not anticipated for timber sales and other activities near known nest sites because the NWFP requires that all known sites and recruitment habitat within one half mile be protected as an LSR. In addition, the PDC of the proposed action prohibit such activity unless protocol surveys are conducted and the sites are found to be unoccupied. Noise disturbance may, however, disrupt normal murrelet behavioral patterns during the critical nesting period if the activity is near unsurveyed murrelet habitat or near an undetected activity.

Noise above ambient levels may disturb adult or juvenile murrelets and could cause them to flush from their nest site, could cause a juvenile to prematurely fledge or could interrupt feeding

attempts by the adult. While the effects of noise are not clear, any of these impacts could result in the reduced fitness or even death of an individual bird due to missed feedings, or reduced protection of the young if adults are disturbed.

There is little data regarding the impacts of noise on murrelets and other listed species. However, the Service has recently analyzed the available data on spotted owls, murrelets and other species (USFWS 2003c; and Appendix D), and has consulted species experts who have worked extensively with murrelets to determine the extent to which above-ambient noises may affect murrelets. The results of this analysis indicate that murrelets may flush from their nest or roost or may abort a feeding attempt of their young when the following activities occur up to the specific distances (Table 12). These distances are somewhat different than the distances for spotted owls due to the available scientific data. In addition, a visual harassment distance of a minimum of one hundred yards is included and is based on an effort by the Services' regional office to quantify both visual and auditory harassment to murrelets (USDI 2003c). This data has been used by the Lacey Washington office of the Service in two biological opinions and it is the Service's current understanding of harassment distances based on the best available science. Consequently, it will be incorporated into this Opinion as current guidance for harassment distances for various activities as it relates to adverse effects to the murrelets from harassment due to disturbance. If the Services' understanding of these distances change, adjustments to these distances may be recommended in the future.

Table 12. Harassment distances from various activities for marbled murrelets.

Type of Activity	Distance at which murrelets may flush or abort a feeding attempt
a blast larger than 2 pounds of explosives	1 mile
a blast of 2 pounds or less	120 yards
an impact pile driver, a jackhammer, or a rock drill	100 yards
a helicopter or a single-engine airplane	120 yards
chainsaws (hazard trees, precommercial and commercial thinning)	100 yards
heavy equipment	100 yards

Above-ambient noises further than these Table 12 distances from murrelets are expected to have either negligible effects or, if the sound reaches no murrelet, no effect to murrelet. The types of reactions that murrelets could have to noise that the Service considers having a negligible impact include flapping of wings, the turning of a head towards the noise, attempting to hide, assuming a defensive stance, etc. (USFWS).

Timing of Disturbance

The risk to murrelets from noise disturbance is tied to the timing of the activity and is highest when adults have eggs in a nest or are feeding and protecting recently fledged juveniles. During these periods the separation of adults and their young could result in death or injury to the young as a result of predation. The leading known causes of mortality in juvenile murrelets are starvation and predation by corvids (Miller 1989; USDI 1990a~listing document).

The timing of these development benchmarks (nesting and fledging) varies geographically, although murrelets generally start laying their eggs around the beginning of April. In Oregon, August 5th is the date by which data indicate that all juveniles are capable of flight and most have likely fledged and returned to the ocean dates.

Activities that may result in above ambient noise levels include the use of mechanized tree harvest equipment, road hauling, aircraft/helicopters, heavy equipment, hydraulic hammers, blasting, road construction and maintenance equipment. In some instances, noise levels produced by these activities can remain above ambient levels out to one mile (for blasting) and may affect murrelets. If potentially disturbing activities are implemented within the prescribed distances (Table 12) of occupied or unsurveyed murrelet habitat during the murrelet critical nesting season (April 1 – Aug 5), those activities are likely to adversely affect murrelets by causing adults to flush from their nest site, nest abandonment, premature fledging, interruption of feeding attempts, or increased predation due to less protection when the adult flushes. After August 5, it is presumed that most fledgling have returned to the ocean and disturbance from proposed actions within the prescribed distances shown in Table 12. Between August 6 and September 15, project activities may affect, but are not likely to adversely affect, murrelets, if daily timing restrictions are applied until September 15

The SW Oregon administrative units will utilize mitigation measures and mandatory PDC to avoid adverse impact to nesting marbled murrelets wherever they occur, but acknowledge that some adverse impact is likely to occur to murrelets due to disturbance in unsurveyed suitable habitat adjacent to project areas. To assess the potential impacts, the SW Oregon administrative units and the Service, using an average of the new Service disturbance distances associated with tree harvest activities (100 yards - Table 12), estimated that 40 percent of an average zone of 300 feet (around a standard project area (presumed to be 50 acres) would be suitable murrelet habitat (as determined by the percentage of suitable habitat in the matrix according to the Environmental Baseline Tables). Area A habitat with the potential for disturbance was calculated to be 1,100 acres and Area B habitat disturbance was anticipated to be 300. This estimate probably exceeds the actual disturbance impact to nesting murrelets because Area B is much less likely to harbor nesting murrelets than Area A.

In the Assessment, the SW Oregon administrative units predicted that up to 30 percent of the potential disturbance acres could possibly occur in or adjacent to unsurveyed murrelet habitat. The Service anticipates that harassment due to disturbance to one third of the 1,400 acres (500 acres) of murrelet habitat could result in the disruption of these normal murrelet behavioral patterns such as feeding, breeding, and shelter from noise disturbance, although the SW Oregon administrative units will implement mandatory PDC to minimize adverse effects due to disturbance. In addition, seven timber sales and three other projects (see Appendix A, Exceptions to PDC) on the Powers and Gold Beach Ranger Districts that require an exception to the seasonal restriction PDC due to safety concerns, instream fish restrictions, or Port-Orford cedar root disease seasonal restrictions. These projects total 1,406 acres, are likely to disturb up to an additional 500 acres of murrelet habitat, and are likely to adversely affect the murrelet due to harassment by disturbance during the critical nesting season. Therefore, a total of 1,000 acres are anticipated to be disturbed by timber sale and related projects in the proposed action.

Murrelet Critical Habitat

The final rule designating Marbled Murrelet Critical Habitat (USDI 1996: 26271-26272) assumed that activities on lands designated as murrelet critical habitat would be conducted according to the standards and guidelines for LSRs, as described in the ROD for the Northwest Forest Plan and that these projects would be unlikely to result in the destruction or adverse modification of murrelet critical habitat. Activities in these areas would be limited to manipulation of young forest stands that are not currently murrelet nesting habitat as well as some removal of older stands (450 acres) immediately adjacent to natural meadows in order to restore meadow habitat that is being encroached upon by conifers. These forest management activities in young stands would be conducted in a manner that would not slow the development of these areas into future nesting habitat, and should speed the development of some characteristics of older forest. The habitat removal associated with the meadow restoration will preclude future nesting in those specific trees removed but no occupied habitat would be impacted as all suitable habitat is required to be surveyed to protocol prior to any activity being conducted within suitable habitat. Habitat removal overall would be minimal within murrelet critical habitat, less than one percent of the suitable murrelet available in Zones A and B.

Other projects that could impair the ability of critical habitat to provide localized nesting opportunities include hazard tree removal and POC sanitation. Hazard tree removal focuses on trees that are not only likely to fall on their own in the near future, but that also pose a hazard to human life or property. It is possible, although extremely unlikely, that an occupied murrelet nest tree would need to be felled during the nesting season in an effort to prevent human injury. The possibility of this occurring, however, is remote to the point that the Service believes this is a discountable effect to murrelet critical habitat. POC sanitation removes trees that are diseased and are destined to die in the near future. In some cases, suitable murrelet nest trees could be removed as a part of this activity. This would not, however, occur in an occupied stand during the nesting season. Also, this activity occurs in such small patches that a stand's habitat characteristics are unlikely to be significantly impacted. In all these cases, if trees with late-successional characteristics are going to be removed from an LSR (all murrelet critical habitat in the SW Oregon administrative unit area is within designated LSR), the Service would need to review and approve the project prior to its implementation. Because of the PDC, the Service concurs that the proposed action is not likely to adversely modify murrelet critical habitat.

Impacts from Activities other than Tree Harvest

There are five other proposed activities in the proposed action that have the potential to affect murrelets either by habitat loss or degradation or disturbance. Some of these proposed activities will remove or downgrade murrelet habitat and are likely to adversely affect the murrelet. However all murrelet habitat will be surveyed to protocol to ensure habitat is not occupied so direct effects to murrelets are expected to be less than if the birds are present. Total loss of murrelet habitat will be no more than 100 acres total for all proposed activities. In addition, some activities such as road maintenance/construction and Port-Orford-cedar sanitation would remove single trees from along roadsides that could be suitable nest habitat for murrelets. There is also some potential for harassment of murrelets due to disturbance from some activities if they were to occur in proximity to unsurveyed murrelet habitat. Harassment from disturbance during the critical nesting season may affect and is likely to adversely affect murrelets. It is anticipated that no more than 100 acres of unsurveyed murrelet habitat will be disturbed during the critical breeding season.

Vegetation management includes non-commercial silvicultural activities consisting, but not limited to, stand density management, conversion, fertilization, pruning, pre-commercial thinning, Port-Orford-cedar sanitation, riparian thinning, animal damage control (gopher baiting), slash piling, and burning. Some habitat degradation along roads (within 75 feet) could result from Port-Orford-cedar sanitation due to the potential loss of suitable murrelet nest trees if they are infected but habitat should remain suitable at the stand level. Potential loss of suitable nest trees along the road associated with Port-Orford-cedar sanitation may affect and is likely to adversely affect the murrelet due to habitat loss.

Recreation includes trail construction and maintenance, and development and maintenance of campgrounds and other facilities. A small amount of suitable habitat might be removed or degraded during campground renovations, or trail construction or reconstruction in the form of hazard trees or trees removed during trail construction. Activities associated with recreation may affect and are likely to adversely affect the murrelet due to habitat loss.

Use of chainsaws or other motorized equipment to maintain trails or campgrounds could disturb nesting murrelets in unsurveyed or occupied habitat if a hazard tree is determined to need felling during the critical nesting season due to safety concerns. In some cases, the potential disturbance associated with maintaining recreation sites or trails may affect and is likely to adversely affect the murrelet due to harassment

Road Maintenance/Construction includes maintenance, restoration or decommissioning, culvert replacement and repair, bridge maintenance and repair, and road re-alignment. Small amounts of murrelet habitat (isolated trees along roads) may be removed during projects, which could degrade habitat, although it would likely still continue to function as suitable habitat at the stand level. Potential loss of suitable nest trees along the road associated with road maintenance/construction may affect and is likely to adversely affect the murrelets due to habitat loss.

Other Special Use Authorizations (permits) include research collecting, commercial permits, group permits, cell towers, power-lines, utility corridors, and other utility facilities. Some removal or degradation of murrelet habitat may occur; however less than ten acres of habitat is expected to be impacted over the life of the Opinion. Activities associated with special use permits and authorizations may affect and are likely to adversely affect the murrelet due to habitat loss.

Mining and Quarry Operations include casual use permits, notices of intent, and plan level permits and operations (60 over the life of the Opinion), and commercial quarries (5 over the life of the Opinion), on action agency lands. Some habitat removal could result from these proposed projects; the total amount of habitat removal is expected to be no more than 75 acres over the life of the plan. This habitat removal from the proposed mining operations may affect and is likely to adversely affect murrelets.

Vernal Pool Fairy Shrimp and Vernal Pool Critical Habitat

There is only one activity proposed by the SW Oregon administrative units that has the potential to adversely affect the fairy shrimp and is associated with recreational use on both the Upper and

Lower Table Rocks, which are managed by the BLM. Recreation associated with both Upper and Lower Table Rocks has the potential to disrupt habitat for the shrimp, as well as cause direct mortality to shrimp due to hikers using trails both in and around the pools in the early spring when the shrimp are active. Hikers may also inadvertently go off trails and wade into pools which could adversely affect the shrimp and their habitat. On Upper Table Rock a trail bisects an occupied pool; the BLM is currently studying ways to redirect the trail and users so as to minimize potential impacts to the pool. Due to the potential for habitat alteration and direct mortality by hikers, recreational use that occurs on the Table Rocks may affect and is likely to adversely affect the vernal pool fairy shrimp. The potential for impacts to the pool habitat also may affect vernal pool fairy shrimp critical habitat on Table Rocks.

VI. Cumulative Effects

Cumulative effects are defined as 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. [50CFR 402.02]. The Service interprets this to include all non-federal actions, including those on county and tribal lands. While the action area is limited to federally managed lands, there are large areas of non-federal land interspersed with the three administrative units, particularly where BLM lands are checkerboarded with non-federal ownership. The cumulative effects analysis of foreseeable non-federal actions provides the Service and the SW Oregon administrative units' context for the current environmental baseline and greater insight into likely trends. Habitat for spotted owls and murrelets has not been comprehensively classified or surveyed on state or private lands. Except for some of the state and private timber company holdings which are large, private tracts typically range in size from 10 to 640 acres. Most lands, including the larger state and private timber company holdings, have been harvested within the past 50 years, and are now in shrub, pole, or large pole condition classes. Some mature forested stands likely exist on county, state, or private land, but these stands likely represent a small proportion of private land ownership. The mature stands likely provide only limited amounts of suitable habitat for listed species such as the spotted owl and murrelet at this time. Mature and large pole stands are presently being logged at an accelerated rate due to present economic conditions and the relatively small amount of federal timber available to local mills since implementation of the NWFP. As an example, data provided by the Oregon Department of Forestry's SW Oregon office shows that in 2002, they received 531 notifications of harvest that encompassed 94,469 acres in Jackson County and 553 notifications of harvest on 17,910 acres in Josephine County. There are approximately 2.5 million acres of non-federal land in the action area and while it is unknown how much of that land is currently capable of growing harvestable forest, even if all of it was forested and the rate of harvest in Jackson and Josephine Counties 2002 was typical for the last ten years, all of the non-federal lands could potentially be harvested in approximately 20 years.

The majority of forests on state and private land in Washington, Oregon, and northern California are used for timber production (Thomas *et al.* 1990, USDA and USDI 1994b). Historically, non-federal landowners have practiced even-aged management (clear cutting) of timber over extensive acreage. Given current market conditions, it is reasonable to assume that these past management practices are likely to continue, thereby reducing the amount of suitable habitat for spotted owls and murrelets on non-federal lands over time. Before the spotted owl was listed as a threatened species under the ESA, Thomas *et al.* (1990) estimated that most non-federal spotted owl habitat in Oregon would be eliminated within 10 years. Although the trend of

harvest on non-federal lands likely continues, not all non-federal NRF was harvested during the 1990's. But given current reported harvest rates, harvest activities on non-Federal lands can be expected to continue to impact spotted owls and murrelets located within adjacent federal lands through the continued reduction and fragmentation of habitat. However it is also likely that there is little late-successional habitat left within the action area on non-Federal lands given the estimated levels of timber harvest in the last ten years.

It is recognized that federal lands will continue to make the significant contribution to the recovery of spotted owls and murrelets through implementation of the NWFP. However, non-federal lands are thought to be important where federal lands are absent or where suitable habitat on Federal lands is believed insufficient to maintain local populations or, in the case of the spotted owl, provide demographic support and movement opportunities across and between physiographic provinces (Thomas *et al.* 1990; USFWS 1992c). While contributions on all non-Federal land may not be critical across the range of these species, contributions in certain regions (including the Ashland I-5 Corridor) could potentially needed to provide additional dispersal habitat with what was thought to be poor connections to adjacent LSRs. This may also be true for the BLM, where over 60 percent of the land within the District boundary is non-Federal. The draft spotted owl recovery plan (USDI 1992c) recommended that non-federal lands in the Galesville area of dispersal concern, and areas to the west, be managed to provide spotted owl dispersal habitat to facilitate movement between the Oregon Klamath Mountains and adjacent provinces, such as the Oregon Coast and South Cascades. However, since then, Forsman (2002) has shown that there is sufficient spotted owl movement across this area on both non-federal and federal lands such that it is likely that the federal lands alone will likely continue to provide for spotted owl dispersal in this area. His conclusions in the paper do not discuss a concern for dispersal for the spotted owl across its range. Further, even with harvest rates thought to be relatively high on non-federal lands, it is highly unlikely that all non-federal lands would ever be in a condition to not contribute, at least to some extent, to spotted owl dispersal across the landscape

In summary, the amount of suitable habitat for spotted owls or murrelets on private land is unknown, it is likely to be relatively low and it will continue to decline. However, such habitat, where it exists, could improve the connectivity between LSRs and will likely continue to provide spotted owl dispersal and murrelet nesting habitat.

Suitable habitat for listed plant species have not been comprehensively classified or surveyed on state or private lands. A substantial amount of land has not been surveyed for fritillary on state and private lands. Increased development on private lands in both rural and urban areas is likely to reduce and detrimentally modify suitable habitat for all four listed endangered plant species. Listed plants only receive protection under the Act on federal lands or from any actions that are federally funded. Federal lands are therefore crucial for the recovery of the plants.

Concurrence

The Service concurs with the SW Oregon administrative units' may affect, not likely to adversely to affect determination for the following proposed activities.

Bald Eagle

The PDC for the bald eagle prohibit any loss of nest or roost trees and prohibit the loss of

suitable bald eagle habitat within ¼ mile of any known nest or roost trees. Activities that cause noise disturbance within ¼ mile or within 2 mile line-of-site are also not allowed. Because bald eagles forage on lakes and rivers, they are much more likely to be impacted by people engaging in recreation activities than by timber harvest activities which can be planned to avoid locations of these conspicuous birds.

Activities or projects that could have a potential adverse impact on bald eagles include hazard tree removal and Port Orford Cedar (POC) sanitation. Hazard tree removal focuses on trees not only likely to fall on their own in the near future, but that also pose a hazard to human life or property. Any felling of a known bald eagle nest or roost tree would require reinitiation of consultation. If hazard tree removal were to remove suitable bald eagle habitat within ¼ mile of a bald eagle nest or roost, this would also require reinitiation of consultation. POC sanitation removes diseased trees that are destined to die in the near future. No bald eagle nest or roost trees would be removed for this purpose under this Opinion. In addition, any change in stand structure due to POC sanitation or any other activity within ¼ mile of a bald eagle nest or roost tree would require reinitiation of consultation. Given the PDC included in the Assessment, the Service concurs with the SW Oregon administrative unit's determination that the proposed action is not likely to adversely affect the bald eagle.

Spotted owl

There are seven other activity types in the proposed action that may affect but are not likely to adversely affect the spotted owl due to the low potential for habitat alteration. As in the case of watershed restoration, PDC are also proposed to ensure that suitable nest trees are not felled for these projects.

Watershed restoration projects includes culvert repair/replacement, road restoration or decommissioning, slope stabilization, habitat improvement projects, stream improvement projects, including tree lining/felling, down wood, and snag creation. Some habitat degradation may occur with activities such as stream improvement projects that use large trees felled into the stream for fish structures. However the PDC for this type of project and others that have the potential to degrade habitat stipulate that no trees with structure will be removed as well as any tree that might contribute to any tree with structure. Activities associated with watershed restoration may affect but are not likely to adversely affect spotted owls due to habitat removal or downgrading of habitat.

Special forest products includes personal use firewood, cedar bough harvest, Christmas trees, Port-Orford-cedar arrow wood sales, mushroom harvest, brush and bear grass cuttings, medicinal plants, pole-size timber, burl and rock removal. No habitat loss will result from any of these activities; special forest products activities may affect but are not likely to adversely affect the spotted owl due to habitat loss.

Weed Control includes weed control treatments include manual methods like mechanical brushing or mowing, sawing, hand-pulling, mulching, digging, grubbing, steaming, burning, seeding, or the introduction of biological control insects. Increased vehicle and ground crew activity could be present for short periods of time in any local (less than 2 weeks). Weed control can also involve the use of select herbicides sprayed from truck or ATV-mounted sprayers, or more often backpack sprayers. The selected herbicides that the BLM is authorized to use are: Glyphosate (Round-up), 2-4-D, Pichloram (Tordon), and Dicamba (Banvil). Most herbicide

treatments for noxious weeds use Glyphosate. The BLM is expected to treat no more than 2,000 acres per year using all methods. The Forest Service is authorized to hand-spray Glyphosate, Pilloram, and Tryclopyr (Garlon); up to 500 acres are treated annually on the Rogue River and Siskiyou National Forests. The Rogue River and Siskiyou are expected to treat no more than 1,100 acres a year by biological, mechanical, manual, and chemical means. There would be no direct impacts, either removal or degradation, to spotted owl habitat with any of the proposed methods of dealing with weeds. This activities will have no effect the spotted due to habitat loss or disturbance.

Fuels management projects include slash piling and prescribed burning, thinning, and brush treatments. Some habitat degradation may occur with activities such as non-commercial thinning and maintenance. Activities associated with fuel management projects may affect but are not likely to adversely affect spotted owls due to the fact that no removal or downgrading of habitat will occur.

Cultural resource projects include projects such as cemetery, bridge, and cabin restoration, and archeological digs. It is unlikely that any habitat removal or downgrading would occur, however there may be some slight degradation of spotted owl habitat involved during project implementation. Cultural resource projects may affect but are not likely to adversely affect the spotted owl, due the fact that no habitat removal or downgrading will occur.

Special forest products includes personal use firewood, cedar bough harvest, Christmas trees, Port-Orford-cedar arrow wood sales, mushroom harvest, brush and bear grass cuttings, medicinal plants, pole-size timber, burl and rock removal. No habitat loss will result from any of these activities; special forest products activities may affect but are not likely to adversely affect the spotted owl due to habitat loss.

Livestock grazing includes allotment renewals, fence construction and maintenance, spring improvements and maintenance, and will likely have no effect on spotted owls. No habitat removal or degradation would occur and it is unlikely that any disturbance to spotted owl habitat would occur from any activities associated with grazing.

Murrelet

There are 11 other activity types in the proposed action that may affect but are not likely to adversely affect the murrelet due to the potential for disturbance or habitat alteration. All unsurveyed or occupied murrelet habitat will be subject to both seasonal and daily restrictions to ensure that murrelets are not disturbed during the critical nesting season (April 1- Aug 5). In addition, as in the case of watershed restoration, PDC are also proposed to ensure that suitable nest trees are not felled for these projects.

Vegetation management includes non-commercial silvicultural activities consisting of, but not limited to, stand density management, conversion, fertilization, pruning, pre-commercial thinning, Port-Orford-cedar sanitation, riparian thinning, animal damage control (gopher baiting), slash piling, and burning. No habitat loss will result from any other of these activities and all other activities will be subject to seasonal and daily restrictions as per the mandatory PDC in the proposed action. The PDC for all activities will ensure that known murrelet sites

and unsurveyed suitable murrelet habitat will not be disturbed during the critical nesting season and all suitable habitat will be surveyed prior to conducting most activities. Disturbance associated with vegetation management may affect and is not likely to adversely affect the murrelet due to harassment.

Special forest products includes personal use firewood, cedar bough harvest, Christmas trees, Port-Orford-cedar arrow wood sales, mushroom harvest, brush and bear grass cuttings, medicinal plants, pole-size timber, burl and rock removal. There may be harassment due to disturbance if some of these activities that produce noise above ambient levels were to occur during the critical breeding season. In particular, burl removal, and firewood and pole size timber cutting employ the use of chainsaws that may produce noise above ambient noise levels; helicopters are used to remove cedar bolts for arrow wood sales. The PDC for all activities will ensure that known murrelet sites and any suitable habitat for murrelets will be not disturbed during the critical nesting season and all suitable habitat will be surveyed. Potential disturbance associated with special forest products may affect and is not likely to adversely affect the murrelet due to harassment due to the daily and seasonal restrictions required by the PDC.

Watershed restoration projects includes culvert repair/replacement, road restoration or decommissioning, slope stabilization, habitat improvement projects, stream improvement projects, including tree lining/felling, down wood, and snag creation. Some habitat degradation may occur with activities such as stream improvement projects where large trees are felled into the stream for fish structures. However, the PDC for this type of project and others that have the potential to degrade habitat stipulate that no trees with structure will be removed, as well as any tree that might contribute to any tree with structure. Activities associated with watershed restoration may affect but are not likely to adversely affect the murrelet due to the lack of removal or downgrading of habitat. The PDC for all activities will ensure that known murrelet sites and unsurveyed suitable murrelet habitat will not be disturbed during the critical nesting season and all suitable habitat will be surveyed prior to conducting most activities. Disturbance associated with watershed restoration may affect and is not likely to adversely affect the murrelet due to the PDC associated with the proposed action.

Fuels management projects include slash piling and prescribed burning, thinning, and brush treatments. Some habitat degradation may occur with activities such as non-commercial thinning and maintenance of fuels. Activities associated with fuel management projects may affect but are not likely to adversely affect murrelet due to no removal or downgrading of habitat. PDC for prescribed fire that restrict smoke into known sites and unsurveyed suitable habitat during the critical nest season will minimize adverse effects and the PDC for all activities will ensure that known murrelet sites or unsurveyed suitable habitat will be not disturbed during the critical nesting season . Potential disturbance associated with fuels management may affect but is not likely to adversely affect the murrelets due to harassment because of the PDC in the proposed action.

Road Maintenance/Construction includes maintenance, restoration or decommissioning, culvert replacement and repair, bridge maintenance and repair, and road re-alignment. Use of chainsaws or other motorized equipment during projects could disturb nesting murrelets in unsurveyed habitat. However, Site-specific PDC and seasonal restrictions for murrelets would reduce impacts to known sites and unsurveyed suitable habitat. Due to the mandatory PDC in

the proposed action, potential disturbance associated with road maintenance/construction will likely not occur during the critical nesting season and the proposed activities may affect but are not likely to adversely affect the murrelet due to harassment.

Other Special Use Authorizations (permits) include research collecting, commercial permits, group permits, cell towers, power-lines, utility corridors, and other utility facilities. Use of chainsaws or other motorized equipment during projects could also disturb nesting murrelets in unsurveyed habitat during the critical nesting season. Site-specific PDC including seasonal restrictions for murrelet would reduce impacts to known sites and unsurveyed suitable habitat. Because these PDC are mandatory in the proposed action, the potential disturbance associated with special use authorizations and permits during the critical nesting season is unlikely. Therefore, special use authorizations may affect but are not likely to adversely affect the murrelet due to harassment.

Mining and Quarry Operations include casual use permits, notices of intent, and plan level permits and operations (60 over the life of the Opinion), and commercial quarries (5 over the life of the Opinion), on action agency lands. The use of chainsaws or other motorized equipment as well as hauling of rock and blasting during projects could also disturb nesting murrelets in unsurveyed spotted owl habitat. However, site-specific PDC such as restriction on blasting within one mile of known sites would reduce impacts to known sites and unsurveyed suitable habitat for murrelets. In addition, both seasonal and daily restrictions to any activities that might cause harassment to murrelets are in place under the proposed action. Because mandatory PDC will be in place during any mining or quarry operations, the potential for disturbance associated with mining and quarry operations may affect but is not likely to adversely affect the murrelets.

Cultural resources projects include restoration projects such as cemetery, bridge, and cabin restoration and archeological digs. It is unlikely that any habitat removal or downgrading would occur; habitat impacts associated with cultural resources may affect but are not likely to adversely affect the murrelet due to habitat loss.

The use of chainsaws, heavy equipment, or other equipment and personnel, if used during such projects, could also disturb nesting murrelets in unsurveyed or occupied habitat. However, site-specific PDC such as restrictions within prescribed distances of known murrelet sites and unsurveyed suitable habitat, would reduce impacts to known sites and unsurveyed habitat. Due to the proposed PDC in the proposed action, these projects may affect but are not likely to adversely affect the murrelet due to disturbance.

Weed Control: Weed control treatments include manual methods like mechanical brushing or mowing, sawing, hand-pulling, mulching, digging, grubbing, steaming, burning, seeding, or the introduction of insects for biological control. Increased vehicle and ground crew activity could be present for short periods of time in any local (less than 2 weeks). Weed control can also involve the use of select herbicides sprayed from truck or ATV-mounted sprayers, or more often backpack sprayers. The selected herbicides the BLM is authorized to use are: Glyphosate (Round-up), 2-4-D, Pichloram (Tordon), and Dicamba (Banvil). Most herbicide treatments for noxious weeds use Glyphosate. The BLM is expected to treat no more than 2,000 acres per year using all methods. The Forest Service is authorized to hand-spray Glyphosate, Pichloram, and Tryclopypyr (Garlon); up to 500 acres are treated annually on the Rogue River and Siskiyou

National Forests. The Rogue River and Siskiyou are expected to treat no more than 1,100 acres a year by biological, mechanical, manual, and chemical means.

The use of heavy equipment, if used, during such projects could disturb nesting murrelets in unsurveyed habitat. However, site-specific PDC such as restrictions within prescribed distances of known murrelet sites and suitable habitat would reduce impacts to known sites. Because of the mandatory PDC in the proposed action, these activities may affect, but are not likely to adversely affect the murrelet due to harassment.

Livestock grazing includes allotment renewals, fence construction and maintenance, and spring improvements and maintenance; these activities will likely have no effect on murrelet. No habitat removal or degradation would occur and it is unlikely that any disturbance to murrelet habitat would occur from any activities associated with grazing.

Road Use Permits for specific current applications for right-of-way agreements and road use permits across federal lands. There are no current applications within the range of the murrelet at this time; road use permits will have no effect to the murrelet.

Vernal Pool Fairy Shrimp and Vernal Pool Critical Habitat

Activities associated with fire suppression such as line construction or use of heavy equipment could potentially affect habitat and shrimp if it was to occur within the pools. However, PDC require that no line construction occur within vernal pool critical habitat. Consequently, prescribed fire activities may affect but are not likely to adversely affect the shrimp or critical habitat if PDC are followed.

Cattle grazing has the potential to impact shrimp and their habitat, however cattle in this allotment are not let out to graze until after April 15 when the shrimp have finished breeding, are not active, and they are encysted within the pools. In addition, some grazing may be beneficial as it reduces competition by introduced plant species and maintains open pool habitat for the shrimp. Cattle grazing may affect, but is not likely to adversely affect vernal pool shrimp or the critical habitat for vernal pool fairy shrimp provided the let out date continues to be April 15 or later.

Mining activities will have no effect to fairy shrimp or fairy shrimp critical habitat as it is unlikely the any surface or placer mining would be proposed in those areas where the shrimp occurs; the Upper Table Rock is an Area of Critical Environmental Concern (ACEC) and mining is prohibited there. If any mining projects are proposed within or adjacent to fairy shrimp habitat, the SW Oregon administrative units will reconsult with the Service.

Listed plants

Specific effects to listed plants could include direct impacts to plant tissue and habitat loss through physical ground disturbance in suitable habitat. Ground disturbance includes soil compaction, soil horizon displacement, and geomorphic alteration. Timber harvests and vegetation management activities can crush plants and have ground disturbing effects to suitable habitat. Direct physical ground disturbance in occupied habitat from heavy equipment such as logging equipment, slashbusters or excavators, or permanent modification of the suitable plant

habitat from mining or quarry development, can have adverse effects on listed plants by crushing, breaking, digging up bulbs and roots. The soil can be compacted or removed so that habitat can no longer support listed plant populations. Plants may also be crushed by work crews inadvertently walking through populations during BLM or Forest Service authorized actions. Crushing the above ground portions of plants may reduce the season's reproduction potential, but is unlikely to eliminate entire populations, unless they are very small, as soil disturbance is minimal and the roots and bulbs will survive. These effects will be negated by the PDC as required in the Assessment. Avoidance of known listed plant populations, avoidance of activities during growing seasons, surveys for and identification of the listed endangered plant species populations by qualified personnel during the appropriate season are required in the PDC for all activities in suitable plant habitat, prior to signing the decision notice or memo. Suitable habitat and dormancy periods for the four species are defined in the Environmental Baseline of the Assessment. Plant population locations in or around activities can then be flagged or geo-referenced. The establishment of no-equipment buffers in population sites found during surveys would eliminate these threats. If possible, activities near known listed plant populations will be avoided. Physical impacts from work crews walking through populations during the growing season will be minimized by seasonal project restrictions, and identification of plant populations to ensure that the field crews are aware of listed plant populations on the ground. This will minimize inadvertent trampling and adverse effects.

The modification of listed plant habitat, such as partial thinning of the canopy, increasing the light regime and available precipitation, can have a beneficial effect for lomatium and fritillary. These activities likely mimic the role that wildfire historically played in these habitats by keeping the site more open. The fritillary and lomatium are likely to benefit from a 40 percent canopy cover. Tree or shrub growth in meadows and woodlands supporting lomatium and fritillary were most likely regulated by wildfire during the species' dormant season. The removal of these trees and shrubs would benefit this species, as these plants prefer openings or full sun. Rockcress may benefit from thinning by removal or reduction of knobcone pine stands. Increasing knobcone pine stands on Red Mountain, Mendocino County threaten populations of rockcress by increased fire risk and the reduction of light. Meadowfoam is not known to benefit from thinning; however, watershed and landform restoration and management activities that improve vernal pool habitat could benefit meadowfoam.

For all four listed plant species, watershed restoration projects are not likely to adversely effect the four listed plants, provided PDC are applied. Action areas in suitable habitat will be surveyed before culvert and instream work. All equipment will be excluded from known plant occurrences by a 100 foot buffer.

Fuels reduction projects can have a long-term beneficial effect by creating more open habitat that is more suitable Gentner's fritillary and Cook's lomatium. With continued fuels treatments, areas containing these listed plants will burn with less intensity in the future, increasing the probability of survival, through decreasing competition with exotic and native shrubs, and creating openings for light and spread of new individuals.

Ground disturbing activities from timber sales, fuels projects, watershed restoration, grazing projects etc., can facilitate the introduction and spread of noxious weeds such as yellow starthistle, dyer's woad, and Canada thistle. Weeds can have an indirect effect by competing with listed plants for light, space, water, and nutrients. The washing of BLM, Forest Service,

and contractor equipment and vehicles can reduce the spread, but does not control noxious weeds. The implementation of PDC for active weed treatment can have a long-term beneficial effect by reducing competition in and adjacent to listed plant sites, while protecting populations from direct effects. Disturbance from grazing also can contribute to increased spread of noxious weeds. Weeds are often found in areas that have experienced plant community changes from heavy grazing in the past, and areas of high livestock concentrations can be prone to invasion by weeds, which can then spread to other areas and compete with listed plants.

Cattle grazing can have effects to fritillary by removal and damage to leaf tissue. Cattle can also browse on certain weeds that compete with the listed plants. Fritillary is highly palatable to deer, and presumably cattle as well. While cattle can walk on and trample plants, reducing the year's reproductive potential, the plants would not likely be killed and the underground bulbs would likely survive. Protection of known fritillary occurrences by changing the grazing size, timing, boundaries, as required by the PDC, will reduce or avoid effects from grazing. Fritillary populations will be surveyed for, identified and measures taken to protect occurrences. High concentrations of recreation use in suitable plant habitat can affect listed plant sites through time. Incidental trampling and flower picking can lead to decreased populations. Small populations of especially showy plants like fritillary would be especially vulnerable to population declines. Noxious weeds also can be introduced into areas of high use such as trailheads or developed recreation sites, and can spread to other areas and compete with listed plants. The implementation of PDC will reduce effects to listed plants.

Collection of forest products can have adverse effects to plants. The collection of burls will not occur within 100 feet of known occurrences of fritillary. Other collections will not occur in areas with known listed plant occurrences. When special permits are issued information will be provided on identification and methods to avoid endangered plants. The action is not likely to adversely affect the listed species with the implementation of PDC.

Additional special permits are authorized, from telecommunication sites, power-lines, special forest product permits, to research permits (see list). Effects are variable and hard to predict from such varied activities, but the PDC will eliminate nearly all direct effects. Surveys for and protection of listed plant populations from ground disturbing activities will protect populations. Maintenance activities of permitted sites that trigger a NEPA review, including vegetation maintenance along powerlines, would also be subject to surveys in suitable habitat and buffering requirements. The issuance of special forest products collection permits in suitable habitat is guided by PDC to reduce effects. Adverse effects are not likely negative given the scope and scale of these permitted activities is so small.

Road maintenance actions are not likely to cause adverse effects, although both lomatium and rockcress can colonize onto road edges from adjacent occupied habitat. Known sites will be protected. Fritillary can be on the edge of undisturbed habitat along roads, and tops could be brushed during the growing season. Plants would not likely be killed, and the lily would likely benefit from the availability of light due to more open edge habitat in following years. Road edge disturbance facilitates the introduction and spread of weeds that can compete with listed plants. In response, much of the federal weed treatment programs, such as hand-pulling and spot spray, are occurring along roads.

Indirect effects from habitat disturbance can have adverse, neutral, or beneficial effects to plants,

depending on the type of disturbance, the intensity and duration, and the timing. Application of seasonal work restrictions in, avoidance of, buffering, and minimizing impacts to known populations will reduce adverse effects in all cases.

Cooks lomatium

Vegetation management, special forest products, watershed restoration, fuels management, road maintenance, issuance of special use permits, mining and quarry operations, and weed control may affect, but are not likely to adversely effect lomatium. Adverse effect to the plants will be minimized by PDC. Insignificant and beneficial effects are expected.

Timber harvests, recreation, livestock grazing, road use permits, and cultural resources will have no effect to the lomatium, due to absence of plant in action areas and application of the PDC.

Gentner's fritillary

Timber harvests, vegetation management, special forest products, watershed restoration, fuels management, recreation, livestock grazing, road maintenance, issuance of special use permits, mining and quarry operations, and weed control may affect, but are not likely to adversely effect fritillary. Adverse effects to the plants will be minimized by PDC. Indirect insignificant beneficial effects to the plant may occur, but will not jeopardize the species.

Issuance of road use permits, and cultural resource activities will have no effect on fritillary in action areas with the implementation of PDC.

Large-flowered woolly meadowfoam

Special forest products, watershed restoration, recreation, livestock grazing, road maintenance, issuance of special use permits, mining and quarry operations, and weed control may affect, but are not likely to adversely effect meadowfoam. Adverse effects to the plants will be minimized by PDC. Indirect insignificant beneficial effects to the plant may occur, but will not jeopardize the species.

Timber harvests, vegetation management, fuels management, grazing, special forest products, issuance of road use permits, and cultural resource activities will have no effect on meadowfoam, due to absence of plant in action areas and application of PDC.

McDonald's rockcress

Special forest products, watershed restoration, fuels management, road maintenance, issuance of special use permits, mining and quarry operations, and weed control may affect, but are not likely to adversely effect rockcress. Adverse effects to the plants will be minimized by PDC. Indirect insignificant beneficial effects to the plant may occur, but will not jeopardize the species.

Vegetation management, recreation, livestock, grazing, issuance of road use permits, and cultural resources activities will have no effect on rockcress due to absence of suitable habitat in action areas and application of PDC.

All significant adverse effects from the project activities will be eliminated by implementation of the PDC for listed plants. Some minor and insignificant effects will occur, mostly from indirect and cumulative effects.

VII. Conclusion

After reviewing the current status of, the environmental baseline within the action area, the cumulative effects, and the effects of the proposed action on the spotted owl, spotted owl critical habitat, the marbled murrelet and its critical habitat, the vernal pool fairy shrimp and vernal pool fairy shrimp critical habitat, it is the Service's biological opinion that the proposed action is not likely to jeopardize the existence of the spotted owl, marbled murrelet, or fairy shrimp and is not likely to destroy or adversely modify designated critical habitat for the spotted owl, marbled murrelet, or fairy shrimp. The Service reached these conclusions based on the following factors:

1. For the reasons discussed in this Opinion, the proposed action will not significantly reduce the amount of NRF available in LSRs. The proposed action may remove or downgrade up to 1,137 acres of NRF within one LSR (LSR RO255). This is approximately one percent of the NRF within this LSR and 0.3 percent of the total NRF (391,000 acres) within LSR network in the action area. The proposed loss of this habitat would not preclude the ability of the LSR network in the action area to function as intended as the remaining NRF (391,000 acres) would continue to provide well distributed and sufficient NRF within the LSR network for the approximately 400 historic spotted owl pairs known for the network. The LSR network should continue to contribute to the recovery goals and conservation needs of the spotted owl by providing multiple clusters of breeding spotted owls throughout the action area.
2. For the reasons discussed in this Opinion, the proposed action is not likely to preclude spotted owl movements between LSRs or between physiographic provinces. The proposed action is well distributed throughout the action area and proposed timber harvest would not reduce dispersal or better habitat within any one watershed in the action area by more than 2 percent. No watershed will have less than 50 percent of its Federal lands providing dispersal or better habitat. All watersheds should continue to provide sufficient dispersal habitat that is well distributed throughout each watershed and the entire action area to allow spotted owls to disperse between LSRs and CHUs and across the landscape.
3. For the reasons discussed in this Opinion, the proposed action will not preclude non-reserve land allocations (Matrix and AMA) ability to function as dispersal habitat for spotted owls or to provide NRF for spotted owls within Matrix or AMA LUAs. Under the proposed action, Matrix and AMA land allocations will continue to provide dispersal habitat as well as NRF for the more than 300 historical spotted owl pairs within those land allocations with over 304,000 acres of NRF remaining if all of the proposed action were to be implemented.
4. For the reasons discussed in this Opinion, the proposed action will not preclude the connectivity goals of the Rogue and SW Coast basins critical habitat network or the adjacent and interconnected CHU networks. The CHU system will also continue to provide over 442,000 acres of NRF for breeding spotted owl pairs. The proposed action

will remove or downgrade 1.7 percent of the total available NRF within the CHU network within the action area. Up to three CHUs may be significantly impacted by the proposed action, OR-74 may lose up to 17 percent NRF, OR-75 may lose up to 25 percent, and OR-71 may lose 6 percent. However the remaining NRF (29,000 acres) will continue to provide suitable habitat for spotted owls within these three CHUs. Impacts to dispersal habitat within CHUs will also occur, however, only 3,224 acres of dispersal habitat will be removed from the CHU network by the proposed action and the NRF and dispersal habitat should continue to provide to dispersal for spotted owls across the landscape. While the proposed action will affect the constituent elements of critical habitat, it is unlikely that the proposed action would appreciably reduce or diminish the survival or recovery of the spotted owl either at the local, provincial, or the range-wide level. The final rule for the designation of critical habitat for the spotted owl and current direction states that adverse modification analysis should be based on impacts to CHUs at the provincial level or higher. Because the Service anticipates that the proposed action may somewhat impair the function of up to three CHUs but will not preclude the goals of any individual CHU or the CHU network within the action area from being met, the provincial critical habitat network will continue to function as intended to provide for both NRF and dispersal habitat and adverse modification of critical habitat is not anticipated by the Service at this time.

- 5 For the reasons discussed in this Opinion, the proposed action is not expected to significantly impact murrelet habitat within the action area. All occupied murrelet habitat will be managed as LSR. Except for rare occasions relating to human safety, no occupied or unsurveyed suitable murrelet habitat will be removed. The relatively small amount of unoccupied habitat proposed for removal will not preclude murrelet critical habitat (LSRs) from functioning as intended.
- 6 For the reasons discussed in this Opinion, effects to fairy shrimp are limited to Table Rocks and will be minimized by BLM proposed changes to recreational use. Critical habitat function will not be precluded by recreational use and changes proposed by the BLM will also minimize effects to vernal pool habitat.
- 7 For the reasons discussed in this Opinion, with all applicable PDC in place for listed plant species, direct and indirect impacts to lomatium, fritillary, meadowfoam and rockcress will be minimized or avoided entirely.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act prohibits taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as 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. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the federal agencies or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), take that is incidental to and not intended as part of the agencies' action is not prohibited provided that such take is in compliance with the terms and conditions of this incidental take statement. Section 7 (b)(4) and 7 (o)(2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a federal permit for the removal or reduction to possession of endangered plants from areas under federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any state or in the course of any violation of a state criminal trespass law.

Amount of Take

Spotted Owl

The Service anticipates that the proposed action could result in incidental take of all spotted owls associated with the removal and downgrading of 31,621 acres of suitable spotted owl habitat from tree harvest and other activities which for the reasons discussed in the effects of the proposed action are considered to be occupied. At the time of the implementation of the NWFP, there were 819 known spotted owl sites well distributed within the action area. Many of the home ranges of the sites overlapped and it is likely that many of these sites are still extant, in particular the LSR sites (>400 sites) where except for the recent fires, little to no habitat alteration has occurred. In southwest Oregon and the Klamath range in particular, the extant habitat is naturally fragmented and it is therefore likely that any available habitat is being used by spotted owls. In addition, surveys in the South Cascade demographic area, in both Matrix and LSR land allocations, show that historic sites have been occupied at an annual average of 79 percent from 1992 to 2002, in 2002 LSR localities were occupied at slightly higher rates than Matrix lands (76 vs. 69 percent) (Anthony et al 2002). Given the relatively high likelihood of NRF within the action area being occupied, it is reasonable to assume that if an activity removes or downgrades NRF, it is likely that the take of spotted owls associated with that habitat would occur.

The Service also anticipates the incidental take of any owls associated with the 1.2 acres of habitat removal that will result from the issuance of the Rough and Ready road use permit.

The Service also anticipates the take of any owls associated with up to 100 acres of proposed research units that may occur within or adjacent to historic and potentially extant spotted owl sites within the Timbered Rock Fire. The Service believes that while these acres are completely burned and not currently considered habitat, it is largely unknown how owls respond to fire,

there is some potential for owls to be associated with or near to these research plots and this research project has the potential to take one or more of these birds.

In addition, there may be up to 9,500 acres of harassment take associated with noise produced by timber harvest and other proposed activities, within one mile for blasting (>2 lbs of explosives.), 120 yards for small blasting (<2 lbs of explosives), airplanes, or helicopters, 65 yards from chainsaws, 60 yards for pile driving equipment, rock drills, or jackhammers, and 35 yards for heavy equipment, of unsurveyed suitable spotted owl habitat during the period from March 1 to June 30. Given the relatively high likelihood of NRF within the action area being occupied as discussed above, it is reasonable to assume that if an activity occurs during the critical breeding season and within the very restricted prescribed harassment distances described above, it is likely that take would occur. While no activities will occur within these specified distances of a known activity center or within NRF located in LSRs during the critical period, most of the action area is not surveyed to protocol and spotted owls within those specified distances of a given activity could experience disturbance that may result in incidental take.

Marbled Murrelet

The Service anticipates the removal or downgrade of up to 3,680 acres of murrelet habitat. Although the proposed action will remove murrelet habitat and is likely to adversely affect the murrelet, the Service anticipates the take of very few, if any, murrelets. All murrelet habitat removed by tree harvest operations or other proposed actions must be surveyed to protocol and determined to be unoccupied prior to any habitat modification. The only take that may occur would be the loss of individual nest trees through hazard tree removal and POC sanitation, or the loss of occupied habitat that was determined to be unoccupied because it fell within the margin of sampling error of the PSG survey protocol. Any nest tree removed under this Opinion during the murrelet nesting season will have some level of survey effort to determine whether an active murrelet nest could be lost. In those cases, every effort will be made to avoid destroying an active murrelet nest. The Service anticipates that the loss of occupied murrelet habitat to any of these causes will be minimal to non-existent.

In addition, there may be up to 1,100 acres of harassment take associated with noise produced by timber harvest or other proposed activities, within one mile for blasting (>2 lbs. of explosives), 120 yards for small blasting (<2 lbs), airplanes, or helicopters, 100 yards from chainsaws, 100 yards for pile driving equipment, rock drills, or jackhammers, and 100 yards for heavy equipment, of unsurveyed suitable murrelet habitat during the period from April 1 to August 5. While no activities will occur within these specified distances of a known murrelet sites during the critical period, there may be instances when an activity would occur within those specified distances of suitable habitat and murrelets could experience disturbance that may result in incidental take. Specifically, there are several exceptions to the PDC that minimize disturbance to murrelets that must occur so the activity will not exacerbate the spread of POC root disease. These activities may occur in areas near suitable murrelet habitat and murrelets could be harassed due to the disturbance associated with the activity.

Vernal Pool Fairy Shrimp

The Service anticipates the take of an unknown number of individuals from recreational activities on Upper Table Rock due to hikers wading in occupied habitats.

Effect of Take

Spotted Owl

The effect of the anticipated take (removal or downgrade of 31,621 acres of NRF) on the spotted owl will reduce the amount of habitat available for nesting, roosting, foraging and dispersal across the action area and between physiographic provinces. It will not, however, significantly reduce the amount of habitat in LSRs, Riparian Reserves or in Congressionally Reserved Areas. Additionally, the proposed action will not preclude the movement of spotted owls across the action area and between physiographic provinces.

The effects to the spotted owl from noise disturbance are more difficult to quantify. However, the Service assumes that there will be spotted owls associated with 9,500 NRF acres and they may be taken because for the reasons discussed above and in the effects of the proposed action all suitable habitat is considered to be occupied. The Service believes that the effect of the harassment take may be the disruption of nesting, roosting, or foraging of some spotted owls and may cause an individual to be more susceptible to predation, prematurely fledge, or may cause missed feedings which could lead to injury or death of a spotted owl.

Murrelet

If there is any take of murrelets it is most likely to occur at a very small scale, as the removal of 4,004 acres of unoccupied habitat would not take any individuals but only likely preclude future nesting activities. The effect of this loss will be tempered by reasonable agency efforts to defer the loss of the tree or trees until after the nesting season. It is unknown what impact the harassment of 1,100 acres of occupied or unsurveyed habitat will have on nesting murrelets. The Service anticipates that the impact will vary depending on the type of noise, the duration of the disturbance, the proximity of the disturbance to occupied habitat, and the sensitivity of individual murrelets to disturbance. In rare cases, a noise-induced movement may expose an adult or juvenile murrelet to elevated levels of predation. The Service anticipates that the risk of mortality associated with this sort of disturbance is relatively low.

Vernal Pool Fairy Shrimp

The effect of take on an unknown number of individual shrimp is largely unknown but direct mortality from recreational use could result in reductions in the existing population or short term impacts to reproduction. It is unlikely to result in permanent degradation of habitat or long term reductions in viability or populations at the site.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures (RPM) are necessary and appropriate to minimize the impacts of incidental take of the spotted owl, the murrelet, and the fairy shrimp.

1. Provide appropriate amounts of spotted owl dispersal and NRF within non-reserve land allocations in a condition and distribution that facilitates spotted owl movement across the landscape.
2. Provide sufficient habitat within LSRs to allow for clusters of breeding spotted owl pairs. Minimize the potential for harassment of all NRF within LSRs.
3. Protect occupied and unsurveyed suitable murrelet habitat.

4. Protect and maintain occupied habitat of the fairy shrimp.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the BLM and the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To address RPMs 1-3, the PDC in the proposed action and found in Appendix A are incorporated herein as terms and conditions.
2. To address RPM 2 and 3, **within LSR** limit the removal of all suitable spotted owl nesting habitat and murrelet suitable habitat to outside of the critical nesting seasons for both species unless protocol surveys indicate the habitat is unoccupied.
3. To address RPM 2, any project that removes or disturbs unsurveyed suitable murrelet habitat between April 1 and August 5 (as identified in the Assessment) must be scheduled as late in the murrelet nesting season as is operationally possible.
4. To address RPM 3, the Medford BLM will monitor the trail that bisects the vernal pool on Lower Table Rock and the trail adjacent to the occupied pool on Upper Table Rock so as to determine if there are any potential impacts to those pools from recreational activities. The BLM will consult with the Service to develop a trail system and recreation management plan that best minimizes adverse effects to the vernal pool system while still allowing for recreational opportunities on the Table Rocks.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed actions. The SW Oregon administrative units shall report to the Service (using a jointly prepared reporting form) the actual impacts of the proposed projects annually, which will be used to make adjustments to the baseline. If take is exceeded that authorized in this incidental take statement, consultation will have to be reinitiated, and the Service and the SW Oregon administrative units will review the need for possible modification of the reasonable and prudent measures and the terms and conditions. This incidental take statement is effective only for those activities that are implemented (as defined earlier in this Opinion) prior to October 1, 2008

The Service analyzed the impact of the above reasonable and prudent measures on the proposed action and believes that these measures comply with the minor change requirement as defined by 50 CFR 402.14(I)(2).

If a dead, injured, or sick endangered or threatened species specimen is located, initial notification must be made to the nearest Service Law Enforcement Office, located at 9025 SW Hillman Court, Suite 3134, Wilsonville, OR 97070; phone: 503-682-6131. Care should be taken in handling sick or injured specimens to ensure effective treatment or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

Notice: The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), if such take is in

compliance with the terms and conditions (including amount and/or number) specified herein.

The incidental take statement contained in the biological opinion does not constitute an exemption for non-listed migratory birds and bald or golden eagles from the prohibitions of take under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (U.S.C. 668-668d), respectively. Proposed federal actions, including those by applicants, should (through appropriate means) avoid, reduce, or otherwise minimize such take which is subject to prosecution under these statutes.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service believes the following conservation recommendations would reduce the impact of the proposed action on listed species within the action area:

1. Information regarding the impacts of specific timber sales in reserved and unreserved allocations would be particularly useful to determine the contribution of these areas to the spotted owl population in the short-term. Monitor all currently known spotted owl activity centers within the median provincial home range distance of proposed projects before and after project implementation. Submit annual monitoring results to the Service.
2. Minimize the loss or degradation of suitable spotted owl habitat within 0.7 miles of known spotted owl nest sites by deferring harvest within that zone.
3. Important information regarding the specific effects of human disturbance on spotted owls and murrelets has been collected; however more is needed to assess the effects of proposed activities on these species. If, in the course of regular survey work, action agency biologists detect a murrelet or spotted owl pair nesting in proximity to the proposed activities, the SW Oregon administrative units should monitor the behavioral response of the birds to noise associated with construction or other human activities. We also request that our office be informed if an opportunity arises for cooperative studies of behavioral response.
4. Monitor the habitat utilization and occupancy rates of barred owls in southwestern Oregon to determine if there are unique dynamics between spotted owls and barred owls that may affect spotted owl recovery.
5. Where feasible, consider extending projects that may disturb murrelets (projects that are exceptions to the PDC) over two years (and scheduling them as late in the nesting season) to reduce the impacts to nesting murrelets.
6. Defer timber harvest for one to three decades around spotted owl activity centers in the Matrix and AMA that have been discovered since January 1, 1994.

7. Conduct annual level one implementation monitoring of timber sales that have been harvested and were addressed in either this consultation or a previous consultation.
8. Include information for identification and avoidance of listed plant species with issuance of special use permits for activities in potential suitable habitat.
9. Conduct annual monitoring of species status and report known adverse impact incidents to species to Service.

REINITIATION NOTICE-CLOSING STATEMENT

This concludes formal consultation and informal conferencing on the actions outlined in your Assessment and during the informal consultation process. Reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the SW Oregon administrative units= action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the SW Oregon administrative units= action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In addition, this analysis is based on the current direction and standards and guideline and land allocations in the NWFP. If the NWFP guidance or land allocations change significantly, reinitiation of formal consultation will be required. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation of formal consultation. If you have any questions regarding this Opinion or would like technical assistance in implementing the provisions of this Opinion, please contact David Clayton of my office at (503) 231-6179.

Sincerely,

/s/ Craig A. Tuss

Craig A. Tuss
Field Supervisor

cc: John Hamilton-FWS Yreka (e)
Dave Solis-FWS Arcata (e)
Lee Webb-USFS Siskiyou National Forest (e)
Larry Salata-FWS Regional Office (e)
Carole Jorgensen-Medford BLM (e)
Bridgette Tuerler, FWS-OFWO Murrelet Files (e)
Office Files, FWS-OFWO, Portland, OR (e)

LITERATURE CITED

- Amsberry, K, and R. J. Meinke. 2002. Reproductive ecology of *Fritillaria gentneri*. Unpublished report prepared for the US Fish and Wildlife Service and the Medford Bureau of Land Management, Medford, Oregon. 40 pp.
- Anderson, D. W. 1988. Dose-response relationship between human disturbance and brown pelican breeding success. *Wildlife Society Bulletin* 16: 339-345.
- Anthony, R. 2000. Demographic characteristics of spotted owls (*Strix occidentalis caurina*) in the southern Cascades; Annual Research Report-Unpublished. Oregon State University.
- Arno, S. 2000. Fire in western forest ecosystems. In: Brown, J. K. and J. K. Smith, eds. *Wildland fire in ecosystems, effects of fire on flora*. Gen. Tech. Rep. RMRS-GTR-42-vol 2. USDA, Forest Service, Rocky Mountain Research Station. Ogden, UT.
- Bart, J. 1995. Amount of suitable habitat and viability of northern spotted owls. *Conservation Biology* 9 (4): 943-946.
- Bart J. and E. D. Forsman. 1992. Dependence of northern spotted owls *Strix occidentalis caurina* on old-growth forests in the western USA. *Biological Conservation* 62: 95-100.
- Begon, M., and M. Mortimer. 1986. *Population Ecology: A Unified Study of Animals and Plants*. Blackwell Scientific Publications, Cambridge, MA. 220 pgs.
- Beissinger, S.R. 1995. Population trends of the marbled murrelet projected from demographic analyses. In Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. *Ecology and conservation of the marbled murrelet*. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Beissinger, S. R., and N. Nur. 1997. Population trends of the marbled murrelet projected from demographic analysis. Appendix B in *Recovery plan for the threatened marbled murrelet (*Brachyramphus marmoratus*) in Washington, Oregon and California*. U. S. Fish and Wildlife Service, Portland, Oregon.
- Bingham, B. B., and B. R. Noon. 1997. Mitigation of habitat “take”: Application to habitat conservation planning. *Conservation Biology* 11 (1): 127-138.
- Blakesley, J.A., Franklin, A.B., and R.J. Gutierrez. 1992. Spotted owl roost and nest site selection in northwestern California. 1992. *Journal of Wildlife Management*, 56(2): 388-392.
- Bentivoglio, N., J. Baldwin, D.E. Mack, T. Max, S. Miller, K. Nelson, C.J. Ralph, M. Raphael, C. Strong, C. Thompson, K. Ostrom, R. Wilk. 2001. DRAFT Northwest Forest Plan marbled murrelet effectiveness monitoring data summary report. Office of Technical Support, USFWS. Portland, OR.
- Bradley, Russell W. 2002. Breeding ecology of radio-marked marbled murrelets (*Brachyramphus marmoratus*) in Desolation Sound, British Columbia. M.S. Thesis, Simon Fraser University, British Columbia. 86 pages.
- Brock, Richard and R. Callagan. 2001. Site review of *Fritillaria gentneri* on BLM lands, 2001 Report. Siskiyou Biosurvey LLC. Ashland, Oregon.

- Brock, Richard and R. Callagan. 2000. Site review of *Fritillaria gentneri* on BLM lands, 2000 Report. Siskiyou Biosurvey LLC. Ashland, Oregon.
- Bureau of Land Management. 2000. Cascade-Siskiyou Ecological Emphasis Area Draft Management Plan/Environmental Impact Statement. March 2000.
- Burger, Alan E. 1997. Behavior and numbers of marbled murrelets measured with radar. *Journal of Field Ornithology* 68(2):208-223.
- Burger, Alan E. 2001. Using radar to estimate populations and assess habitat associations of marbled murrelets. *Journal of Wildlife Management* 65:696-715.
- Burger, Alan E. 2002. Conservation assessment of marbled murrelets in British Columbia, a review of biology, populations, habitat associations and conservation. Pacific and Yukon Region, Canadian Wildlife Service. 168 pages.
- Burnham, K.P., D.R. Anderson, and G.C. White. 1996. Meta-analysis of vital rates of the northern spotted owl. Pages 92-101. *In* Forsman, E.D., S. DeStefano, M.G. Raphael, and R.J. Gutierrez (Tech. Eds.). *Demography of the northern spotted owl. Studies in Avian Biology*. No. 17.
- CDC (Centers for Disease Control and Prevention). 2003. West Nile Virus Website. Accessed on March 20, 2003, at: <http://www.cdc.gov/ncidod/dvbid/westnile/>.
- Chen, Jiquan. 1991. Edge effects: microclimatic pattern and biological responses in old-growth Douglas-fir forests. Seattle, WA: University of Washington. PhD thesis, 174 pages.
- Chen, J., J.F. Franklin and T.A. Spies. 1992. Vegetation responses to edge environments in old-growth Douglas-fir forests. *Ecological Applications* 2(4):387-396.
- Chen, J., J.F. Franklin and T.A. Spies. 1993. Contrasting microclimates among clearcut, edge, and interior and old-growth Douglas-fir forest. *Agricultural and Forest Meteorology* 63:219-237.
- Cooper, Brian A., Diane Evans-Mack, and Martin G. Raphael. 2001. Radar-based monitoring of marbled murrelets. *Condor* 103(2):219-229.
- Craighead, J.J., and F.C. Craighead. 1956. *Hawks, owls and wildlife*. Stackpole, Harrisburg, PA U.S.A.
- Csuti, B., Kimerling, J.A., O=Neil, T.A., Shaugnessy, M.M., Gaines, E.P., and Juso, M.M. 1997. *Atlas of Oregon wildlife: distribution, habitat, and natural history*. Oregon State University Press; Corvallis, Oregon. 492 pages.
- Dechesne, S. B. C., and J. L. Smith. 1997. *Wildlife inventory Queen Charlotte Islands/Haida Gwaii 1994-1996*. Husby Group of Companies. 49 pages.
- Delaney, D. K., T. G. Grubb, L.L. Pater. 1997. Effects of Helicopter Noise on Nesting Mexican Spotted Owls, U.S. Air Force CES/CEV, Holloman Air Force Base, Project Order No. CE P.O. 95-4. 49pp.
- Delaney, D.K., T.G. Grubb, L.L. Pater and H.M. Reiser. 1999. Effects of helicopter noise on Mexican spotted owls. *J. Wildl. Manage.* 63(1):60-76.

- De Santo, Toni L., and Mary F. Willson. 2001. Predator abundance and predation of artificial nests in natural and anthropogenic coniferous forest edges in southeast Alaska. *Journal of Field Ornithology* 72(1):136-149.
- Divoky, G.J., and M. Horton. 1995. Breeding and natal dispersal, nest habitat loss and implication for marbled murrelet populations. *In* Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Dunbar, D. L., B. P. Booth, E. D. Forsman, A. E. Hetherington, and D. J. Wilson. 1991. Status of the spotted owl, *Strix occidentalis*, and barred owl, *Strix varia*, in southwestern British Columbia.
- Forsman, E.D. and R. Anthony. 1999. Analysis of demographic rates of northern spotted owls. Executive Summary. April 19, 1999.
- Forsman, E.D., Anthony, R. G., Reid, J. A., Loschl, P. J., Sovern, S. G., Taylor, M., Biswell, B. L., Ellingson, A., Meslow, E. C., Miller, G. S., Swindle, K. A., Thrailkill, J. A., Wagner, F. F., and D. E. Seaman. 2002. Natal and breeding dispersal of northern spotted owls. *Wildlife Monographs*, No. 149. 35 pp.
- Forsman, E.D., Meslow, E.C., Wight, H.M. 1984. Distribution and biology of the spotted owl in Oregon. *Wildlife Monographs*, 87:1-64.
- Franklin, A. B., K. P. Burnham, G. C. White, R. J. Anthony, E. D. Forsman, C. Schwarz, J. D. Nichols, and J. Hines. 1999. Range-wide status and trends in northern spotted owl populations. U.S. Geological Survey, Colorado and Oregon Cooperative Fish and Wildlife Research Units, Fort Collins, CO and Corvallis, OR. 71 pp.
- Ganey, J.L., W.M. Block, J.K. Dwyer, B.E. Strohmeier, and J.S. Jenness. 1998. Dispersal movements and survival rates of juvenile Mexican spotted owls in northern Arizona. *Wilson Bulletin* 110:206-217.
- Goforth, Dwain. 1980. The taxonomy and ecology of the *Arabis mcdonaldiana* complex of northwestern California and southwestern Oregon. Progress report, September 15, 1980. Six Rivers National Forest, Eureka, California.
- Haig, S.M., Wagner, R.S., Forsman, E.D., and T.D. Mullins. 2001. Geographic variation and genetic structure in spotted owls. *Conservation Genetics* 2(1): 25-40.
- Hamer, T. E. 1988. Home range size of the northern barred owl and northern spotted owl in western Washington. M.S. Thesis. Western Washington University, Bellingham, WA.
- Hamer, T.E. and S.K. Nelson. 1995. Nesting chronology of the marbled murrelet. *In* Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Hamer, T.E. and S.K. Nelson. 1998. Effects of disturbance on nesting marbled murrelets: summary of preliminary results.
- Harvey, R.D., Jr. and P.F. Hessburg, Sr. 1992. Long-Range Planning for Developed Sites in the Pacific Northwest: The Context of Hazard Tree Management. U.S. Department of Agriculture.

- Henson, P. and T.A. Grant. 1991. The effects of human disturbance on trumpeter swan breeding behavior. *Wildl. Soc. Bull.* 19: 248-257.
- Herter, D.R., and L.L. Hicks. 2000. Barred owl and spotted owl populations and habitat in the central Cascade Range of Washington. *Journal of Raptor Research* 34(4): 279-286.
- Hickman, James C. Editor 1993. *The Jepson Manual Higher Plants of California*. Univ.of California Press, Berkeley. 1400 pp.
- Huettman, F., E. Cam, D. B. Lank, R. Bradley, L. Loughheed, L. McFarlane Tranquilla, C. Loughheed, Y. Zharikov, P. P.-W. Yen, N. Parker, and F. Cooke. *Manuscript*. Breeding habitat selectivity for large-scale habitat features by marbled murrelets in fragmented and virgin old-growth forest landscapes. *Wildlife Monographs*.
- Hunter, J.E., R.J. Gutiérrez, and A.B. Franklin. 1995. Habitat configuration around Spotted Owl sites in northwestern California. *Condor* 97:684–693.
- Jimerson, T. M., and D. W. Jones. 2000. Ecological and watershed implications of the Megram Fire. USDA Forest Service, Eureka, CA
- Johnson, D.H. 1992. Spotted owls, great horned owls, and forest fragmentation in the central Oregon Cascades. Master's Thesis, Oregon State University, Corvallis, OR.
- Johnson, K.N., S. Crim, K. Barber, M. Howell, and C. Cadwell. 1993. Sustainable harvest levels and short-term timber sales for options considered in the report of the Forest Ecosystem Management Assessment Team: Methods, Results, and Interpretations. Oregon State Univ., USDA Forest Service and USDI Bureau of Land Management. Portland, OR. 96 pp.
- Kaufman, K. 1987. The practiced eye: spotted owl and barred owl compared. *American Birds* 42(3): 355-356.
- Kelly, E.G. 2001. Range expansion of the Northern Barred Owl: an evaluation of the impact on Spotted Owls. M.S. Thesis, Oregon State Univ., Corvallis, OR U.S.A.
- Komar, N., Langevin, S., Hinten, S., Nemeth, N., Edwards, E., Hettler, D., Davis, B., Bowen, R., and M. Bunning. 2003. Experimental infection of North American birds with the New York 1999 strain of West Nile virus. *Emerging Infectious Diseases* 9(3):311-322.
- Isaacs, Frank. Oregon State University. Personal Communication. May 22, 2001.
- Isaacs, F. and B. Anthony. 2000. Oregon State University. Results of the 2000 bald eagle nest survey. Unpublished literature.
- Lahaye, W.S., and R.J. Gutierrez. 1999. Nest sites and nesting habitat of the northern spotted owl in northwestern California. *Condor* 101: 324-330.
- Lahaye, W.S., Guitierrez, R.J., and J.R. Dunk. 2001. Natal dispersion of the spotted owl in southern California: dispersal profile of an insular population. *Condor* 103: 691-700.
- Laidig, K.J., and D.S. Dobkin. 1995. Spatial overlap and habitat association of Barred Owls and Great Horned Owls in southern New Jersey. *J. Raptor Res.* 29:151–157.
- Lank, David B., Nadine Parker, Elizabeth A. Krebs, and Laura McFarlane Tranquilla. 2003. Geographic distribution, habitat selection, and population dynamics with respect to nesting habitat characteristics, of marbled murrelets. Centre for Wildlife Ecology, Simon Fraser University, Burnaby, Canada. 66 pages.

- Leach, Lilla I. 1932. Herbarium specimen #3465 collected on June 6, 1932. Oregon, Curry County, Red Mountain, elevation 3,800 feet. Determined by D. Wagner. Housed at Oregon State University Herbarium.
- Leskiw, T., and R.J. Gutiérrez. 1998. Possible predation of a Spotted Owl by a Barred Owl. *Western Birds* 29:225–226.
- Long, L.L. and C.J. Ralph. 1998. Regulation and observations of human disturbance near nesting marbled murrelets. Redwood Sciences Laboratory, Pacific Southwest Research Station, USFS. Arcata, California.
- Luginbuhl, John M., John M. Marzluff, Jeffrey E. Bradley, Martin G. Raphael, and Daniel E. Varland. 2001. Corvid survey techniques and the relationship between corvid relative abundance and nest predation. *Journal of Field Ornithology* 72(4):556-572.
- Mack, D.E., W.P. Ritchie, S.K. Nelson, E.K. Harrison, P. Harrison, and T.E. Hamer. 2003. Methods For Surveying Marbled Murrelets In Forests: A Revised Protocol for Land Management and Research. Pacific Seabird Group, Marbled Murrelet Technical Committee. 6 January 2003
- Manley, Irene A. 1999. Behavior and habitat selection of marbled murrelets nesting on the Sunshine Coast. Masters of Science Thesis. Department of Biological Sciences, Simon Fraser University, Burnaby, Canada. 163 pages.
- Marshall, D.B. 1988. Status of the Marbled Murrelet in North America: with special emphasis on populations in California, Oregon, and Washington. Audubon Society of Portland.
- Mayfield, George. U.S. Fish and Wildlife Service. Personal communication. September 5, 2001.
- Meekins, D. J., and T. E. Hamer. 1998. Use of radar to monitor marbled murrelets at inland sites in the North Cascades of Washington: Preliminary Report. USDA Forest Service. 16 pages.
- Menges, E.S. 1991. "The application of Minimal Viable Population Theory to Plants." In *Genetics and Conservation of Rare Plants*. Edited by D.A. Falk and K.E. Holsinger. New York: Oxford University Press.
- Meyer, C. B., S. L. Miller, and C. J. Ralph. 2002. Multi-scale landscape and seascape patterns associated with marbled murrelet nesting areas on the U.S. west coast. *Landscape Ecology* 17:95-115.
- Meyer, J.S., Irwin, L.L., and M.S. Boyce. 1998. Influence of habitat abundance and fragmentation on northern spotted owls in western Oregon. *Wildlife Monographs* 139: 1-51.
- Miller, G.S. 1989. Dispersal of juvenile northern spotted owls in western Oregon. M.S. Thesis. Oregon State University, Corvallis, Oregon. 139 pages.
- Miller, G.S. 1989. Dispersal of juvenile spotted owls in western Oregon. M.S. Thesis. Oregon State University, Corvallis, Oregon.
- Miller, G.S., R.J. Small, and E.C. Meslow. 1997. Habitat selection by spotted owls during natal dispersal in western Oregon. *J. Wildl. Manage.* 61(1):140-150.

- North, M.P., Franklin, J.F., Carey, A.B., Forsman, E.D., and T. Hamer. 1999. Forest stand structure of the northern spotted owl's foraging habitat. *Forest Science*, 45(4): 520-527.
- Nelson, S.K. and T.E. Hamer. 1995a. Nesting biology and behavior of the marbled murrelet. *In* Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Nelson, S.K. and T.E. Hamer. 1995b. Nest success and the effects of predation on marbled murrelets. *In* Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Nelson, S. Kim, and Amanda K. Wilson. 2002. Marbled murrelet habitat characteristics on state lands in western Oregon. Corvallis, OR: Oregon Cooperative Fish and Wildlife Research Unit, OSU, Department of Fisheries and Wildlife. 151 pages.
- ONHP. 1997. Oregon Natural Heritage Program, rare plant database. Large-flowered wooly meadowfoam site data. Portland, Oregon.
- ONHP. 1998. Oregon Natural Heritage Program, rare plant database. Large-flowered wooly meadowfoam site data. Portland, Oregon.
- Pacific Seabird Group. 1996. Assessment of marbled murrelet nesting habitat. July 15, 1996, letter from the Pacific Seabird Group to Mike Spear, Region 1 director of the U.S. Fish and Wildlife Service. 2 pages. Pacific Seabird Group. 1998. Suggestions for 1998 inland surveys for marbled murrelets.
- Parmesan, C., and G. Yohe. 2003. A globally coherent fingerprint of climate change impacts across natural systems. *Nature* vol. 421: 37-42.
- Paton, P., C. Zabel, B. Bingham, H. Sakai, and C. Ogan. 1990. Examination of home-range size and habitat use of the spotted owl in the Klamath Province. U.S. Forest Service Redwood Science Laboratory, Arcata, CA. Unpublished report.
- Paton, P. W. C., C. J. Ralph, and R. A. Erickson. 1992. Use of an inland site in northwestern California by marbled murrelets. *Proceedings of the Western Foundation of Vertebrate Zoology* 5:109-116.
- Pearson, R.R., and K.B. Livezey. In review. Distribution, numbers, and site characteristics of spotted owls and barred owls in the Cascade Mountains of Washington. Submitted to *J. Raptor Res.*, June 10, 2002.
- Primack, R.B. 1996. Lessons from Ecological Theory: Dispersal, Establishment, and Population Structure. *In* Restoring Diversity: Strategies for Reintroduction of Endangered Plants. Edited by D.A. Falk, C.I. Millar, and M. Olwell. Washington D.C., Island Press.
- Roylance, F.D. 2002. West Nile virus and raptors die-off. *The Baltimore Sun*, September 30, 2002.

- Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Ralph, C.J., and S.L. Miller. 1995. Offshore population estimates of marbled murrelets in California. *In* Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Regional Ecosystem Office. 1995. Criteria to exempt specific silvicultural activities in LSRs and MLSAs from REO review. April 20, 1995. Portland, Oregon.
- Regional Ecosystem Office. 1996a. Criteria to exempt specific silvicultural activities in late-successional reserves and managed late-successional areas from Regional Ecosystem Office review. July 9, 1996. Portland, Oregon.
- Regional Ecosystem Office. 1996b. Amendment to “criteria to exempt specific silvicultural activities in late-successional reserves and managed late-successional areas from Regional Ecosystem Office review” of July 9, 1996. September 9, 1996. Portland, Oregon.
- Regional Ecosystem Office. 1997. Regional Ecosystem Office review of Siskiyou habitat improvement project in the Siskiyou late-successional reserve (LSR), Smith River NRA. July 15, 1997. Portland, Oregon.
- Raphael, Martin G., Diane Evans-Mack, and Brian A. Cooper. 2002. Landscape-scale relationships between abundance of marbled murrelets and distribution of nesting habitat. *Condor* 104(2):331-342.
- Reijnen, T., Foppen, R., Ter Braak, C. and J. Thissen. 1995. The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32:187-202.
- Rodgers, J.A., Jr, and H.T. Smith. 1995. Set-back distances to protect nesting bird colonies from human disturbance in Florida. *Conservation Biology* 9(1):89-99.
- Rodway, M. S., H. M. Regehr, and J. P. L. Savard. 1993. Activity patterns of marbled murrelets in old-growth forest in the Queen-Charlotte-Islands, British Columbia. *Condor* 95:831-848.
- Rodway M. S., and H. M. Regehr. 2002. Inland activity and forest structural characteristics as indicators of marbled murrelet nesting habitat in Clayoquot Sound. Pages 57-87 *in* A. E. Burger and T. A. Chatwin, editors: Multi-scale studies of populations, distribution and habitat associations of marbled murrelets in Clayoquot Sound, British Columbia. Ministry of Water, Land and Air Protection, Victoria, British Columbia, Canada.
- Rohlf, D. J. 1989. The endangered species act, a guide to its protections and implementation. Stanford Environmental Law Society, Stanford Law School, Stanford, CA. 207pp.
- Singer, S. W., D. L. Suddjian, and S. A. Singer. 1995. Fledging behavior, flight patterns, and forest characteristics at marbled murrelet tree nests in California. *Northwestern Naturalist* 76:54-62.

- Sisco, C. L., and R. J. Gutierrez. 1984. Winter ecology of radio-tagged spotted owls on the Six Rivers National Forest, Eureka, CA: U.S. Department of Agriculture, Forest Service, Six Rivers National Forest. Eureka, CA.
- Solis, D. M. 1983. Summer habitat ecology of northern spotted owls in Northwestern California. M. S. Thesis. Humboldt State University, Arcata, CA.
- Speich, S.M., and T.R. Wahl. 1995. Marbled murrelet populations of Washington-marine habitat preferences and variability of occurrence. *In* Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Strong, C.S., B.K. Keitt, W.R. McIver, C.J. Palmer, and I. Gaffney. 1995. Distribution and population estimates of Marbled Murrelets at sea in Oregon during the summers of 1992 and 1993. Pages 339-352 in Ralph *et al.* (eds.). *Ecology and Conservation of the Marbled Murrelet*. Gen. Tech. Rep. PSW-GTR-152.
- Strong, C.S., and T.M. Carten. 2000. Marbled murrelets at sea in Oregon: status of abundance and reproduction during 1999. Draft final report to the Oregon Department of Fish and Wildlife. Portland, Oregon. 17pp.
- Strong, C. S. 2003. Marbled murrelet abundance and reproductive indices in Oregon during 2002. Oregon Department of Fish and Wildlife, Wildlife Diversity Program. 14 pages.
- Strong, C. S. 2003. Status of marbled murrelets at sea in conservation zone 5: Mendocino, Sonoma, and Marin counties. Crescent Coastal Research, Astoria, Oregon. 22 pages.
- Swindle, K.A., W.J. Ripple, E.C. Meslow, and D. Schafer. 1999. Old-forest distribution around spotted owl nests in the Oregon Cascade Mountains, Oregon. *J. Wildl. Manage.* 63:1212–1221.
- Taylor, A. L., and E. D. Forsman. 1976. Recent range extension of the barred owl in western North America, including the first records for Oregon. *Condor* 78:560-561.
- Tesh, R.B. 2003. Cross immunity - West Nile versus St. Louis encephalitis virus in areas of overlap. Fourth National Conference on West Nile Virus in the United States. New Orleans, LA, February 9-11, 2003.
- 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 of the Interagency Scientific Committee to address the conservation of the northern spotted owl. Portland, Oregon. U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service. 427 p.
- Tweten, R. 1992. Narratives of final critical habitat units for the northern spotted owl in Oregon. Unpublished literature. USFWS.
- U.S. Department of Agriculture. 1995. Biological assessment, FY95/96 timber sale and other projects, Mt. Hood National Forest. USDA Forest Service, Mt. Hood National Forest, Gresham, OR.
- U.S. Department of Agriculture. 2000. Draft Sky Lakes Wilderness Management Plan. Rogue River National Forest-Prospect and Butte Falls Ranger Districts.

- USDA Forest Service. 2000. Biological assessment for the Big Bar Complex Fire. Shasta-Trinity National Forest, Redding, CA.
- U.S. Department of Agriculture and U.S. Department of the Interior. 1994a. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. U.S. Forest Service, Bureau of Land Management, Portland, OR. 2 vols. and appendices.
- U.S. Department of Agriculture and U.S. Department of the Interior. 1994b. Final supplemental environmental impact statement on management of habitat for late-successional and old-growth forests related species within the range of the northern spotted owl. U.S. Forest Service, Bureau of Land Management, Portland, OR.
- U.S. Department of Agriculture and U.S. Department of the Interior. 1998. Rogue river/south coast FY 99/00 timber sale projects biological assessment. U.S. Forest Service and Bureau of Land Management, Grants Pass, OR.
- USDA Forest Service and USDI Bureau of Land Management. 2003. Rogue River South Coast biological assessment FY 2004-2008 for activities that may affect listed species in the South Coast Rogue River Province. U.S. Dept. of Agriculture (Forest Service, Rogue River and Siskiyou National Forests), U.S. Dept. of Interior (Bureau of Land Management, Medford, OR).
- U.S. Department of Agriculture, U.S. Department of the Interior, U.S. Department of Commerce and the Environmental Protection Agency. 1993. Forest ecosystem management: an ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team. U.S. Forest Service, U.S. Fish and Wildlife Service, National Marine Fisheries Service, National Park Service, Bureau of Land Management, and the Environmental Protection Agency, Portland, OR.
- U.S. Department of the Interior. 1985. Recovery plan for the Pacific bald eagle. U.S. Fish and Wildlife Service, Portland, OR. 160 pp.
- U.S. Department of the Interior. 1987. The northern spotted owl status review. U.S. Fish and Wildlife Service, Portland, OR.
- U.S. Department of the Interior. 1989. The northern spotted owl; a status review supplement. U.S. Fish and Wildlife Service, Portland, OR.
- U.S. Department of the Interior. 1990a. Endangered and threatened wildlife and plants; determination of threatened status for the northern spotted owl; final rule. Federal Register, 50 CFR 17: 26,114-26,194.
- U.S. Department of the Interior. 1990b. 1990 status review: northern spotted owl; *Strix occidentalis caurina*. Report to the U.S. Fish and Wildlife Service, Portland, OR. U.S. Department of the Interior. 1992a. Endangered and Threatened Wildlife and Plants; determination of critical habitat for the northern spotted owl. Fed. Reg. Vol. 57, No. 10:1796-1838. January 15, 1992.
- U.S. Department of the Interior. 1992b. Endangered and threatened wildlife and plants; determination of threatened status for the Washington, Oregon, and California population of the marbled murrelet, final rule. Federal Register 50 CFR 17: 45328-45337.
- U.S. Department of the Interior. 1992c. Recovery plan for the northern spotted owl. Final draft.

- U.S. Fish and Wildlife Service. Portland, Oregon. 2 Volumes.
- U.S. Department of the Interior. 1994. Final biological opinion for the preferred alternative of the 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. Portland, Oregon.
- U.S. Department of the Interior. 1995. Endangered and threatened wildlife and plants; bald eagle reclassification; final rule. Federal Register Notice: 36,000-36,010.
- U.S. Department of the Interior. 1996. Endangered and threatened wildlife and plants; determination of critical habitat for the marbled murrelet; final rule. Federal Register, 50 CFR 17: 26256-26320
- U.S. Fish and Wildlife Service. 1996. Biological opinion on Rogue River/South Coast biological assessment; FY 97/98 timber sale projects, FY 97/05 for all other projects. U.S. Fish and Wildlife Service; Portland, OR.
- U.S. Department of the Interior. 1999. Endangered and Threatened Wildlife and Plants: Final Endangered Status for the Plant *Fritillaria gentneri* (Gentner=s fritillary). Federal Register, 64 (237): 69195 - 69203.
- U.S. Department of the Interior. 2000. Proposed endangered status for *Lomatium cookii* and *Limnanthes floccosa* ssp. *grandiflora* in Oregon. Federal Register. Vol. 65, No. 94. May 15, 2000.
- U.S. Department of Agriculture and U.S. Department of the Interior. 2001. Rogue River/South Coast Biological Assessment: FY 01-03 timber sale projects for Medford district, Bureau of Land Management Rogue River and Siskiyou national forests.
- U.S. Department of Agriculture and USDC National Marine Fisheries Service. 1998. Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act.
- U.S. Fish and Wildlife Service. 1997. Recovery plan for the threatened marbled murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. Portland, Oregon. 203 pp.
- U.S. Fish and Wildlife Service. 1998. Biological opinion on the Rogue river/south coast FY 99/00 timber sale projects biological assessment. U.S. Fish and Wildlife Service; Portland, OR
- USDI Fish and Wildlife Service. 1990. McDonald's Rock-cress (*Arabis mcdonaldiana* Eastwood) Recovery plan. U.S. Fish and Wildlife Service, Portland, Oregon. 40pp.
- U.S. Fish and Wildlife Service. 2001a. A range wide baseline summary and evaluation of data collected through section 7 consultation for the northern spotted owl and its critical habitat: 1994-2001. Region 1, Portland, Oregon.
- U.S. Fish and Wildlife Service. 2001b. Environmental Baseline Update for the Northern Spotted Owl in the Rogue River Basin and South Coast Drainages. Oregon Fish and Wildlife Office. Portland, OR.

- USDI Fish and Wildlife Service. 2001c. Formal and informal consultation and informal conferencing on habitat modification and noise disturbance timber harvest activities for fiscal years 2001, 2002, and 2003. U. S. Fish and Wildlife Service, Oregon Fish and Wildlife Office, Portland, OR.
- USDI Fish and Wildlife Service. 2003a. Northern spotted owl consultation effects tracker. U. S. Fish and Wildlife Service Region 1 internal website, Portland, OR.
- USDI Fish and Wildlife Service. 2003b. Final Recovery Plan for *Fritillaria gentneri* (Gentner's fritillary). U.S. Fish and Wildlife Service, Portland, OR.
- USDI Fish and Wildlife Service. 2003c. Marbled murrelet sound and visual harassment decision support tools: draft user guide, version 7.0. USDI Fish and Wildlife Service, Office of Technical Support, Portland, Oregon.
- U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Consultation handbook: procedures for conducting consultation and conference activities under section 7 of the endangered species act. Washington, D.C.
- Veroujean, D.H. II and W.A. Williams. 1995. Abundance and distribution of marbled murrelets in Oregon and Washington based on aerial surveys. In Ralph, C.J., G.L. Hunt jr., M.G. Raphael, J.F. Piatt, tech. eds. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Vorobik, Linda A. 2002. The *Arabis macdonaldiana* group (Brassicaceae: *A. blepharophylla*, *A. oregana*, *A. aculeolata*, and *A. macdonaldiana*) from Southwestern Oregon and northwestern California. Report prepared for Medford District BLM.
- Waterhouse, F. L., R. Bradley, J. Markila, F. Cooke, and L. Loughheed. 2002. Use of airphotos to identify, describe, and manage forest structure of marbled murrelet nesting habitat at a coastal British Columbia site. British Columbia Forest Service, Nanaimo, Canada. 19 pages.
- Washington Department of Fish and Wildlife. 1990. Working implementation plan for bald eagle recovery in Oregon and Washington. Bald Eagle Working Team for Oregon and Washington. Olympia, WA.
- Ward, J.W. Jr., Gutierrez, R.J., and B.R. Noon. 1998. Habitat selection by northern spotted owls: the consequences of prey selection and distribution. Condor 100: 79-92.
- Weathers, W.W., Hodum, P.J., and J.A. Blakesley. 2001. Thermal ecology and ecological energetics of California spotted owls. The Condor 103: 678-690.
- Zabel, C. J., K. M. McKelvey, and J. P. Ward, Jr. 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.
- Zharikov, Y., D. B. Lank, F. Huettmann, R. W. Bradley, N. R. Parker, P. P.-W. Yen, L. McFarlane Tranquilla, and F. Cooke. *Submitted*. Nest site selection and breeding success in marbled murrelets in relation to distances to edges and forest patch size, at Desolation Sound and Clayoquot Sound, British Columbia, Canada. Auk.

Personal communications

Mousseaux, Mark. 2003. Personal communication. Medford District BLM Botanist.

Forsman, Eric. 2003. Personal Communication. OSU research biologist.

Hannan, Debbie. 2003. Personal communication. Oregon State Dept. of Forestry Employee.

On-line Resources

USDA Forest Service Region Five. 2003. Six Rivers National Forest - Fire and Aviation: 1999 Fire Season. Available:<http://www.fs.fed.us/r5/sixrivers/fire/1999/>