IMPORTANCE OF WESTERN OREGON BLM LANDS AND RESERVES TO FISH AND WILDLIFE CONSERVATION

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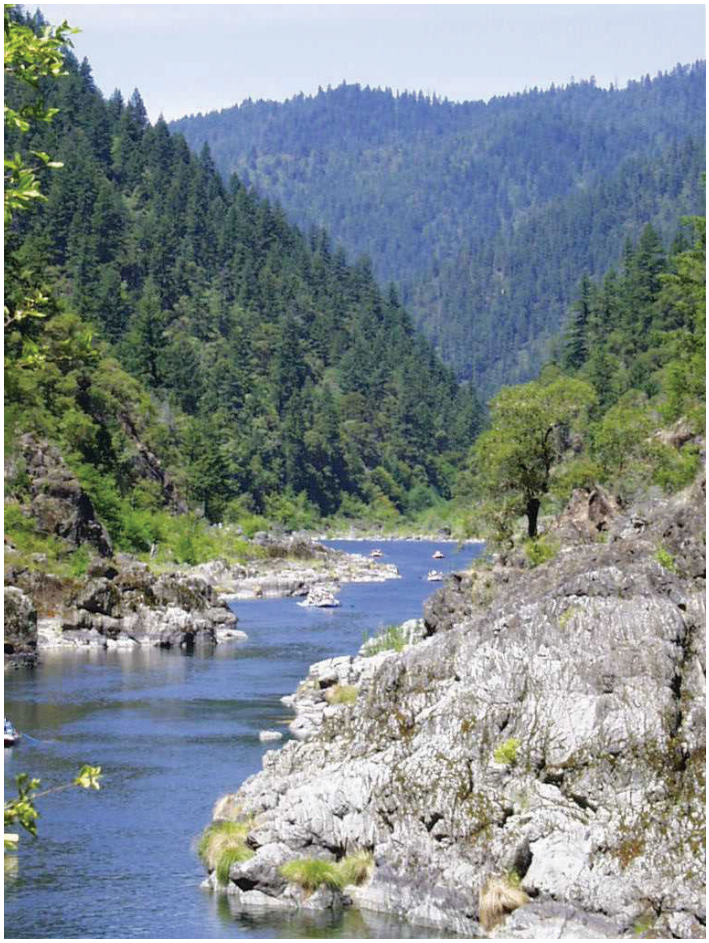

BLM Zane Grey Roadless Area, southwest Oregon
Photo: Klamath-Siskiyou Wildlands Center

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EXECUTIVE SUMMARY

Western Oregon contains approximately 2.5 million acres of lands managed by the Bureau of Land Management (BLM) across six districts (Salem, Eugene, Coos Bay, Roseburg, Medford, and Lakeview): approximately 2.1 million acres of this is managed under the requirements of the O&C Lands Act of 1937 and other laws with the remainder (406,600 acres) managed as "public domain" lands (USDI BLM 2005). All these lands are managed under the provisions of the Northwest Forest Plan (NWFP), with nearly a third (739,000 acres) designated as late-successional reserve (LSR). Each of the BLM districts completed Resource Management Plans (RMPs) in 1995 that incorporated land-use allocations and standards and guidelines pursuant to the NWFP. However, a lawsuit filed by the American Forest Resource Council (AFRC) and others against the Secretaries of Agriculture and the Interior (i.e., Secretaries) alleged that the NWFP violated the terms of the O&C Act and numerous other laws. The Secretaries, AFRC, and the O&C counties agreed to settle this lawsuit in August of 2003, requiring BLM to revise its RMPs and consider at least one alternative that will not create (i.e., eliminate) any reserves on O&C lands except as needed to avoid jeopardy to species listed as threatened or endangered under the Endangered Species Act (ESA). Consequently, the BLM is now conducting scoping for an Environmental Impact Statement (EIS) to revise its RMPs that will determine how the agency should manage the O&C lands to achieve the O&C Act requirements of permanent forest production, sustained yield, community economic stability, and watershed protection (as interpreted by the United States Court of Appeals for the Ninth Circuit) while complying with applicable laws such as the ESA and the Clean Water Act. Here, we provide BLM with a scientific foundation for managing its lands to meet the ecological objectives of the NWFP, ESA, and Clean Water Act by: (1) demonstrating the importance of the reserve network within the context of the NWFP and more specifically within western Oregon BLM lands (both O&C and public domain lands); (2) evaluating potential consequences of eliminating or reducing protections for LSRs and Riparian Reserves under consideration by the BLM; (3) highlighting potential cumulative impacts from adjoining Habitat Conservation Plans (HCPs) on State and private lands; and (4) raising significant issues for BLM to consider in RMP revisions, particularly alternatives to the elimination of reserves. Using computer mapping analysis in a geographic information system (GIS), we documented the importance of BLM lands, in general, and reserves, in particular, as follows:

- **BLM reserves are fundamentally important to the ecological objectives of the NWFP**. LSRs and Riparian Reserves provide essential habitat for hundreds of species associated with unlogged older forest conditions that have been greatly reduced across the entire region, especially on non-federal lands. The reserve network was deemed by U.S. District Court Judge Dwyer and by FEMAT (1993) as the **bare minimum** (emphasis added) necessary to comply with laws requiring viability of old-growth associated species, including the federally threatened northern spotted owl (*Strix occidentalis caurina*) and marbled murrelet (*Brachyramphus marmoratus)*. The reserve network therefore is the "backbone" of species protections across the region; however, the network is not yet functional as over 40% of the reserves are structurally simplified young forests originating from previous clearcut logging. Consequently, reductions in reserve allocations and diminished connectivity among reserves caused by logging in and among them will likely reduce viability of many at risk species.
- **BLM reserves contain significant amounts of late-seral (LS/OG) habitat.** BLM lands contain 900,000 acres of old growth (>150 years) and 590,000 acres of mature (80-150 years) forest, 22% and 15% of the old and mature forests in western Oregon, respectively. LSRs contain a disproportionately higher percentage of old-growth forest than is found on BLM lands outside reserves: 39% of BLM land is old growth in western Oregon while BLM LSRs are 49% old-growth by area.
- **BLM lands and LSRs are essential to recovery of the federally threatened northern spotted owl.** Western Oregon contains 3.7 million acres of critical owl habitat, 1 million acres (27%) of which is on BLM land. BLM LSRs contain nearly 600,000 acres of owl habitat—which is 58% of the suitable owl habitat on BLM land in western Oregon. Collectively, BLM LSRs contain 16% and 25% of the total owl critical habitat in western Oregon and the Coast Range, respectively. Therefore, any reduction in BLM reserves will likely result in significant losses of both nesting habitat and dispersal success with adverse consequences to owl viability. Due to the tightly integrated nature of the reserve network, the loss of reserves on BLM land will diminish the likelihood that Forest Service lands can continue to meet NWFP objectives for spotted owls.
- **BLM lands and LSRs are important to the recovery of the federally threatened marbled murrelet.** There are 1.5 million acres of marbled murrelet critical habitat in

western Oregon—nearly 40% of the total critical habitat in the Pacific Northwest—mostly in the Coast Range. BLM lands contain 485,000 acres (32%) of critical murrelet habitat, 83% of which is found within LSRs. BLM LSRs account for 27% of the total critical habitat for marbled murrelets in western Oregon. Without the full network of LSRs (both USFS and BLM), it will likely be impossible to meet the goals of the recovery plan for this species.

- **BLM lands contain overlapping critical habitat for both spotted owl and marbled murrelet.** Spotted owl and marbled murrelet habitat overlaps mainly along the coast—886,000 acres of overlapping habitat in western Oregon—making these lands especially important for meeting recovery goals for both species. Of this, 303,000 acres (34%) are found within BLM LSRs. The Coos Bay District is particularly important for both species with 79% of BLM LSRs containing overlapping critical habitat
- **The Northwest Forest Plan is a key underpinning of the Oregon Plan for Salmon and Watersheds: depending on how BLM intends to manage its lands in the future, the foundations of salmon conservation could be seriously undermined**. There are 1.8 million acres of coho (*Oncorhynchus kisutch*) ESU area on BLM land in western Oregon and 650,000 acres of coho ESU's in BLM LSRs—35% of the ESU area on BLM land. Of the 6,297 miles of spawning and rearing habitat within western Oregon, 12% of it is located on BLM lands, 100% is in Riparian Reserves, and 44% of which is within LSRs. There are 370,000 acres of chinook (*O. tshawytscha*) ESU habitat on BLM land in western Oregon: 16% of BLM land in western Oregon contains chinook ESU's and half of the BLM lands in Salem and Eugene districts contain chinook ESU habitat. Further, there are 63,000 acres of chinook ESU habitat in BLM LSRs—17% of the total ESU area on BLM land. Additionally, there are 218,000 acres of steelhead (*O. mykiss*) ESU habitat on BLM land in western Oregon, all of which is found in the Salem and Eugene districts. Nine percent of BLM land in western Oregon contains steelhead ESU acres with 35,000 steelhead ESU acres in BLM LSRs—16% of the total ESU area across BLM land. BLM lands play a critical role in efforts to conserve imperiled salmonids.
- **BLM lands contain significant inclusions of Key Watersheds that act as a network of reserves for aquatic species and are important to proper stream functions.** Western Oregon contains 3.9 million acres of Key Watersheds, 154,000 (4%) of which

are located within BLM LSRs. In the Coast Range, LSRs protect 9% of Key Watersheds overall, encompassing over 25% of 10 of the 38 key watersheds in this area.

- **Riparian Reserves on BLM lands are essential to the proper functioning of terrestrial and aquatic ecosystems and stream flows.** These reserves help maintain connectivity across aquatic and terrestrial ecosystems and improve travel and dispersal conditions for hundreds of species that depend on them. They are also vital to proper ecological function and stream flow. BLM needs to map these areas and protect them as specified in the NWFP.
- **BLM lands provide essential habitat for over 400 rare species.** Of the 404 survey and manage species (primarily rare species at risk of local extirpation) recognized in the NWFP, 149 species are found on BLM land and 93 are found within BLM LSRs. LSRs in the Salem BLM District contain the highest concentration of these species (54), followed by Roseburg (39), and Coos Bay (35). Species include red tree vole (*Arborimus longicaudus*, an important food source for spotted owls), and many species of vascular plant, mollusk, lichen, fungi, and bryophyte.
- **Cumulative actions from reductions in protections on federal lands (e.g., survey and manage, Aquatic Conservation Strategy, salvage logging in LSRs) combined with deficiencies in Habitat Conservation Plans (HCPs) on non-federal lands could trigger jeopardy decisions for listed species**. In the Coos Bay District, there are two large parcels with HCPs (located between two isolated BLM LSRs) that are meant to increase habitat connectivity and complement management within LSRs: the privately owned Weyerhaeuser-Millicoma and the Elliott State Forest. Collectively, these parcels increase the potential dispersal area for northern spotted owls and marbled murrelets by 309,000 acres. They are also important to coho salmon, tripling the spawning and rearing habitat in the District and increasing the rearing and migration habitat ten-fold. Non-federal HCPs appear not to be meeting recovery objectives and thus BLM, along with the cooperating agencies (US Fish and Wildlife Service, National Marine Fisheries Service), need to consider cumulative actions of reduced protections on both federal and non-federal lands during Section 7 consultations. Protections for federally listed species will need to be increased on State and private lands, especially if BLM reduces its role in recovery of listed species.

- **The majority of BLM lands are highly fragmented and in need of restoration.** Western Oregon is heavily impacted by past logging and road building with approximately 113,000 miles of roads, 13,000 miles of which occur on BLM land**.** BLM LSRs contain approximately 5,330 miles of roads with road densities ranging from 0 – 12.5 miles/mi^2 (mean = 2.4 miles/mi^2), considered above critical thresholds for sensitive wildlife. Thus, many LSRs and other BLM O&C lands would benefit from additional strategic road closures, decommissioning of roads, and off-highway vehicle (OHV) restrictions to increase functionality of the reserve network.
- **BLM roadless areas are vital as salmon strongholds and refugia for sensitive species.** BLM lands contain 268,181 acres of unroaded areas (>1,000 acres) spread over 146 areas across all BLM allocations; 76 of these are small unroaded areas totaling 105,000 acres within BLM LSRs. The majority of unroaded acres are within one large LSR adjacent to Wild Rogue Wilderness and Siskiyou National Forest in the Medford BLM District – the Zane Grey Roadless Area. This area is threatened by logging and should receive consideration as an Area of Critical Environmental Concern (ACEC) or Wilderness Study Area (WSA).

Based on the above findings, we recommend that BLM:

- **Consider transferring O&C lands (at a minimum, all reserves and threatened species habitat areas) to the Forest Service** where such lands can be managed as part of the National Forest system and reserve network under the ecological objectives of the NWFP as the statutory requirements for listed species and the Plan are far less ambiguous and stronger on national forests. The need for coordinated and consistent implementation of the reserve network has been recognized since at least the Interagency Scientific Committee (ISC) Report in 1990 (Thomas et al. 1990).
- **Design RMP alternatives to seek volume (small diameter) from thinning plantations and small trees (<80 years) in association with comprehensive restoration measures** that include rescaling the road system, restoring streams, addressing fire and fuel issues, and variable-spaced thinning. Based on our calculations and a one-time entry for timber volume, this could potentially generate ~1.6 billion board feet from the Matrix and Adaptive Management Areas with an additional 717 million board feet of small trees from reserves.

- **Inventory and then determine whether roadless areas, Riparian Reserves, Key Watersheds, ESU units, and LSRs qualify for protective designations** as Wild and Scenic corridors, Botanical Areas, Research Natural Areas, Areas of Critical Environmental Concern, Wilderness Study Areas, or Forest Reserves. We believe this recommendation is consistent with the Federal Land Policy and Management Act (FLPMA) 1976 that directs BLM to consider multiple use issues in RMP revisions and not just timber production.

INTRODUCTION

Since 1994, approximately 24.5 million acres of Forest Service and BLM lands within the range of the northern spotted owl have been managed under the NWFP (USDA Forest Service 1994a). The Plan shifted federal lands management from predominately resource extraction towards a more balanced multiple-use approach based on ecosystem management that relied on various land-use designations, including: Late-Successional Reserves (LSRs: 7.4 million ac); Congressionally Reserved Areas (7.3 million ac); Matrix (4 million ac); Riparian Reserves (RRs: 2.6 million ac); Adaptive Management Areas (AMAs: 1.5 million ac); Administrative Withdrawn Areas (1.5 million ac); and Managed Late-Successional Areas (102,200 ac) (USDA Forest Service 1994a). Based on the Plan's provisions and other laws, strictest protection was afforded to Congressionally Reserved Areas and, for at least a period of time, for Administrative Withdrawn Areas where logging was off limits; timber management activities were permitted in other designations particularly to achieve "ecological" objectives such as LSRs and Riparian Reserves (i.e., consistent with development of late-seral and riparian conditions, respectively), and commercial logging was emphasized in the Matrix and AMAs (the latter based on adaptive management provisions of the Plan). Notably, only about 42% of LSRs region-wide actually contain older forests (USDA Forest Service 1994a, Strittholt et al. in review) and thus the reserve network may not be functional until old growth is restored throughout the reserve network overtime.

Oregon contains nearly 10 million acres or just over 40% of the public lands managed under the NWFP. The majority of this land (73%) is administered through the USDA Forest Service, but a quarter of it (~2.5 million acres) is managed by the BLM. Of this, approximately 2.1 million

acres are managed under the provisions of the O&C Act and other laws while the remainder (406,600 acres) is managed as "public domain" lands. Nearly one third of the total BLM lands (739,000 acres) are located within LSRs as defined by the NWFP (Figure 1). These reserves are "keystone" elements of the NWFP, as they provide habitat for species associated with older forest conditions. Indeed, U.S. District Court Judge William Dwyer noted that the LSRs and Riparian Reserves on O&C lands were an integral part of the NWFP and critical to the Plan's viability (*Seattle Audubon Society v. Lyons*, 1994). Because of their importance in satisfying the requirements of the ESA, Judge Dwyer concluded that without the O&C reserves, "the Record of Decision would have to be reconsidered because of the loss of important late-successional and old growth habitat and riparian reserves." Further, Judge Dwyer noted that the reserve network was the **minimum** (emphasis added) necessary to avoid future listings under the ESA, which otherwise could have shut down the timber program on federal lands indefinitely.

For the past ten years, the BLM has managed its federal lands within the NWFP area under six Resource Management Plans (RMPs) guided by the Plan. All of the BLM districts have current Resource Management Plans (RMPs) that were completed in 1995 and which have incorporated land-use allocations and standards and guidelines of the NWFP. However, after the 1995 RMPs were completed, the American Forest Resource Council (AFRC) and others filed a lawsuit against the Secretaries of Agriculture and the Interior (i.e., Secretaries) alleging that the Record of Decision for the Plan violated the O&C Act and numerous other laws. Although this case was twice dismissed, and languished without resolution for almost ten years, the timber industry's claims were given new life with the current administration. As part of a complex suite of agreements affecting management of federal forests and threatened wildlife in the Pacific Northwest, the Secretaries, AFRC, and the O&C counties agreed to settle this lawsuit in August 2003, requiring BLM to revise its current RMPs and consider at least one alternative that will not create any reserves (i.e., eliminate them) on O&C lands except to the extent needed to avoid jeopardy to species listed as threatened or endangered under the ESA. The revisions to the existing RMPs also will answer the question regarding how the BLM should manage the O&C lands to achieve the O&C Act requirement of permanent forest production (as interpreted by the United States Court of Appeals for the Ninth Circuit) while complying with applicable laws such as the ESA and the Clean Water Act. In particular, the O&C plaintiffs claimed that the NWFP

eliminated the sustained yield provisions of the O&C Act and that BLM must now comply by eliminating reserve protections within the context of other provisions of the Act and applicable laws

The O&C settlement agreement with the O&C plaintiffs called for the Forest Service and BLM to use their best efforts every year beginning in FY 2005 to: (1) offer timber sales equal to the annual sale quantity (ASQ) in the NWFP (currently estimated at 805 million board feet annually across the entire region on both Forest Service and BLM lands), and (2) offer thinning sales in LSRs amounting to approximately 300 million board feet per year (to the extent the sales are consistent with the NWFP provisions). Before this settlement was approved, timber harvest was allowed for ecological purposes, but there were never any numerical targets for timber harvest in the reserves. Consequently, the BLM is conducting scoping in preparation for a 2007 Environmental Impact Statement (EIS) to cover changes to its RMPs. The alternatives under consideration include *No Action* (continued management under current RMPs) and *Alternatives* that could remove or weaken protections for BLM O&C reserves except as required by law to avoid jeopardy to species listed as threatened or endangered under ESA (USDI BLM 2005).

PURPOSE AND NEED

In scoping meetings with the BLM, the agency is soliciting public input on how O&C lands should be managed within the context of the NWFP and the O&C settlement agreement (USDI BLM 2005). In response, we submit this assessment of the importance of BLM western Oregon lands, especially LSRs, in meeting the ecological objectives of the NWFP, particularly those involving threatened and endangered species such as the northern spotted owl and marbled murrelet, "survey and manage" species as recognized by the NWFP, and Evolutionarily Significant Units (ESUs) of salmonids protected under the ESA. Our assessment includes the Salem, Eugene, Coos Bay, Roseburg, and Medford BLM districts; we did not include Lakeview as there are no LSRs in that District. Our specific objectives were to:

(1) evaluate the importance of the reserve network within the context of the NWFP and more specifically within BLM western Oregon O&C lands;

(2) determine potential consequences of eliminating or reducing protections for LSRs and Riparian Reserves under consideration by the BLM;

(3) highlight cumulative impacts of adjoining Habitat Conservation Plans (i.e., HCPs) on non-federal lands in conjunction with possible reduced protections on BLM lands and effects on Forest Service abilities to meet NWFP ecological objectives; and
(4) provide options for BLM to consider other than the elimination of reserves as consistent with NEPA and FLPMA.

For this report, we focus on the following ecological issues: (1) importance of reserves to mature and old-growth (late seral) associated species and other wildlife; (2) mature and old-growth forests; (3) northern spotted owl recovery; (4) marbled murrelet recovery; (5) survey and manage species; (6) connectivity among reserves and physiographic provinces; (7) coordination with non-federal landowners; (8) salmonid evolutionary significant units; (9) Key Watersheds; (10) Riparian Reserves; and (11) roadless areas. In addition, we provide a social and economic alternative for obtaining timber volume without having to cut old trees. All data sets used in report analyses are listed in Appendix A.

IMPORTANCE OF RESERVES

The architects of the NWFP assumed that the reserve network would function as the "keystone" to the ecological objectives of the Plan for the following reasons: (1) insurance against stochastic events that could eliminate key habitats and/or species overtime; (2) protection of key ecological processes (not just structure); and (3) opportunity for dispersal of late-successional (mature and old growth or LS/OG habitat) associated species within and among reserves. FEMAT (1993) recognized the need for reserves as fundamental to the Plan as reserves represent the most scientifically credible conservation strategy for the northern spotted owl and other species associated with late-successional forests. We note that the 1990 Report of the Interagency Scientific Committee (ISC Report, Thomas et al. 1990) was the result of an interagency agreement between the U.S. Department of Agriculture (U.S. Forest Service) and the U.S. Department of the Interior (BLM, U.S. Fish and Wildlife Service, and National Park Service). The charter commissioning the Committee was signed by the heads of four agencies, including the BLM. This charter, recognized in law in October 1989, was formed to develop a "scientifically-credible conservation strategy for the northern spotted owl." The reserve network was an integral part of that strategy. Accordingly, there was no credible alternative strategy that

would allow logging of mature and old-growth forests within reserves without jeopardizing species viability (see Thomas et al. 1990). These prior efforts recognized that smaller reserves supporting smaller owl populations were more vulnerable to extirpation events, while larger reserves more closely spaced would be more secure based on widely held principles in conservation biology (FEMAT 1993 p IV-21). Any reductions in the size, spacing among reserves (i.e., connectivity), and redundancy of the reserve network could affect spotted owl demographics, placing greater risks on a species in decline throughout much of its range.

In sum, the design criteria for the NWFP reserve system included:

- A network of large reserves each capable of supporting >20 pairs of owls.
- Reserves spaced not more than 12 miles from two or more adjacent reserves (where establishment of large 20 pair areas was not possible, smaller reserves could be established not more than 7 miles apart.). The objective was a redundant interconnected network of reserves.
- Reserves circular as possible to maximize interior forest conditions.
- Reserves widely distributed throughout the range of the owl.
- Reserves representative of the various elevations and ecological zones, with particular emphasis on lower elevation forests that are more biologically productive.
- Reserves encompassing, as much as possible, existing old forest, and areas known or likely be occupied by spotted owls or marbled murrelets.

FEMAT (1993) gave three specific purposes for the reserves, including that they provide: (1) a distribution, quantity, and quality of old-forest habitat sufficient to avoid foreclosure of future management options; (2) habitat for viable, well-distributed populations of species, including the northern spotted owl and marbled murrelet that are associated with late-successional forests; and (3) greater assurance that the full range of late-successional biodiversity will be conserved (see FEMAT 1993 pp IV-21 to 23, and 31).

The ISC Report (Thomas et al. 1990) reviewed the range of available conservation options and determined that only an inter-connected network of large reserves could reasonably assure compliance with the wildlife laws. The ISC specifically stated:

- Recent focus on the role of habitat blocks in conservation biology has sparked much debate, discussion, and speculation. No specialist in the field, however, would dispute that habitat blocks should be a key component of a conservation strategy to assure the long-term persistence of a given species that is subject to widespread, systematic reduction in the amount of its suitable habitat. Much of the debate has focused on the "SLOSS" issue whether a "single large or several small" blocks totaling the same area would be better for a reserve design [p 283].
- Those aspects of the SLOSS debate, and of island biogeographic theory in general, that bear on the spotted owl issue deal with the likelihood of local extinction in relation to the sizes of habitat islands (thus potential population sizes) and the distances separating islands [p 284].
- A successful strategy also requires assuring that dispersing juveniles have a high probability of locating and filling vacancies created by deceased territory holders [p 285].
- Successful dispersal is an essential feature of a conservation strategy: without it, deceased individuals in the breeding population will not be replaced by recruits among dispersing juveniles and displaced adults, and the population will decline to extinction. Consensus exists among biologists that, all else being equal, continuous suitable habitat supports more individuals of a species targeted for conservation than does fragmented (discontinuous) habitat.
- When large blocks of suitable habitat for a species exist, however, the rate of successful dispersal from one block to another clearly declines with increasing distance between them (Appendix O). Our own modeling efforts indicate that long-term spotted owl persistence is unusually sensitive to the distance between blocks of suitable habitat in relation to the percentage of the landscape that a dispersing [304] individual can search before perishing (appendix M). As Miller (1989:1-2) states, "the distance between adjacent pairs or groups of breeding owls should be such that dispersal of juveniles can replace losses (deaths or emigrations) among existing pairs and provide for the

colonization of suitable, unoccupied habitats. An understanding of dispersal in juvenile spotted owls is thus basic to formulation of criteria for appropriate spacing of habitat to accommodate owl pairs.

- The habitat conservation strategy proposed here does not depend on specific corridors for dispersal of the northern spotted owl. Instead, we provide recommendations for managing the landscape to facilitate movement of owls between habitat conservation areas (HCAs) [p 303-304].
- Success of the spotted owl conservation strategy proposed here depends on frequent dispersal between HCAs, which means that HCAs must be separated by distances well within the known dispersal ranges of juveniles. We based our determination of appropriate distances between HCAs primarily on results from radio-marked birds … … we contend that replacement of adults lost from the breeding population by recruits from within their natal HCA is the primary reason why larger blocks of habitat (hence more pairs of birds) tend to persist longer than smaller blocks with fewer pairs (appendices M and 0). This opportunity would seldom be available in a fully developed network of SOHAs [spotted owl habitat areas], however, because a bird that dispersed a relatively short distance would usually find itself in unsuitable habitat for breeding, and its natal area (the SOHA) would usually still be occupied by its parents. Birds dispersing from SOHAs would need to locate another SOHA to find suitable breeding habitat, and its availability would depend on whether the appropriate sex was missing from the pair in that SOHA [p 307].

Location of individual HCAs was based on the following considerations: (1) land ownership (primarily on public lands); (2) current and future population distribution to assure viability; (3) occurrence of known pairs and availability of suitable habitat; (4) availability of, or potential for, sufficient pairs to support target densities; (5) ability of reserve lands to support owls; (6) inclusion of the full range of elevational gradients to maintain a diversity of habitats; and (7) proximity to other HCAs [p 318].

FEMAT (1993) also recognized over 8,000 terrestrial (including arthropods) and aquatic species closely associated with late-successional forests. Several of these (e.g., 404 “survey and

manage" species) were believed to be at risk of population declines due to rarity and continued logging (see discussion of survey and manage species below). Consequently, the viability of a large number of species may be tied to reserves and how lands outside them are managed. Ironically, a separate survey and manage law suit and settlement with industry required the agencies to get rid of the survey and manage program, subsequently increasing reliance on reserves at a time when the O&C settlement is now asking the agencies to remove the very reserves that many survey and manage species may increasingly rely upon.

Recent advances in conservation biology reaffirm the wisdom of FEMAT in designing a reserve network for late-seral associated species, particularly when viewed within the context of responsible management in the surrounding "matrix" (Lindenmayer and Franklin 2002). In addition, species closely associated with late-successional forests may be particularly dependent on reserves, because forests outside them are logged too regularly and contain trees too small to meet their needs. The northern spotted owl and red-cockaded woodpecker (*Picoides borealis*) are well-known examples of such species in the U.S. (Simberloff 1998). Species typical of post-fire habitats with abundant standing dead trees, such as many woodpeckers, also depend on unlogged forests because post-fire recovering areas outside reserves are typically salvage-logged (Hutto 1995, Franklin and Agee 2003, Lindenmayer et al. 2004). In addition, those with narrow geographic distributions (i.e., endemics, many survey and manage species and other BLM species of concern) and specialized habitat requirements may not persist outside reserves where management eliminates essential habitat.

We note that there is no scientific evidence indicating that stepped up logging within reserves will not result in loss or degradation of critical habitat for spotted owls or marbled murrelets, thereby triggering a jeopardy decision. In fact, according to a Forest Service report issued during viability assessments for old-growth associated species when BLM was considering cutting in old-growth reserves previously, "[S]pecifically … Bureau of Land Management's intentions to selectively cut forest stands to create conditions favorable for spotted owls, represents increased risks to the viability of the spotted owl" [USDA Forest Service 1993 p 145]. While FEMAT intended for some logging (i.e., thinning) to take place in reserves, this was restricted to younger stands (< 80 years old) within LSRs to accelerate development of late-seral conditions and

reduce fire hazards. In fact, the architects of the NWFP saw no need for management of stands >80 years old in the west-side reserves because there was no evidence that logging these older stands will improve habitat, and evidence that it would likely degrade habitat (Thomas et al. 1990). In the last ten years, evidence has mostly supported these assumptions and conclusions (USFWS 1996, Raphael 2002, Anthony et al. 2004). Notably, FEMAT (1993) recognized that the reserves would not be fully functional for over a century, as nearly 60% of them are currently not in late-seral condition (with 40% of the reserves originating from previous logging). Consequently, the reserve network already was considered the bare minimum necessary to avoid jeopardy of listed species and any departures from this would likely fall below minimum thresholds needed for species recovery.

MATURE AND OLD-GROWTH FOREST

The forests of western Oregon (extending from the Pacific Ocean to the crest of the Cascade Range) are dominated by Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*), although there is a narrow zone of Sitka spruce (*Picea sitchensis*) along the coast and western hemlock is absent from the mixed evergreen forests of the Siskiyou Mountains (see Franklin and Dyrness 1973). Such forests provide habitat for a number of old-growth associated species, the most notable of which are the northern spotted owl and marbled murrelet. They also help maintain suitable aquatic habitat for native salmonid species, particularly providing slope stability, stream shading, and coarse woody debris inputs to streams.

Western Oregon (all ownerships) contains 4 million acres of old-growth forest (>150 years old) and 3.9 million acres of mature forest (50-150 years old; Strittholt et al., in review). Using the Forest Cover/Operations Inventory dataset from the BLM (Appendix A) and a definition of mature forest as 80-150 years old, BLM lands in western Oregon contain 900,000 acres of old growth (>150 years old) and 590,000 acres of mature forest, 22% and 15% of the old and mature forests in western Oregon, respectively, or nearly 40% of the entire late-seral/old growth (LS/OG) in western Oregon.

Using the BLM GIS dataset and old-growth and mature forest definitions above, we calculated that BLM LSRs contain over 400,000 acres of LS/OG, or 28% of the total LS/OG on BLM land

in western Oregon (Table 1). LSRs are particularly important because they represent a higher percentage of old-growth forest than is found on BLM lands outside reserves: 39% of BLM land is old growth in western Oregon while BLM LSRs are 49% old-growth by area. The NWFP reserve design also was skewed toward highly productive lands in lower elevations—about 75% of BLM LSRs (by area) are located at elevations of 3,000 feet or lower—so BLM's disproportionate coverage of low elevation lands play a pivotal role in the overall reserve network.

During the period of the NWFP (1994 and 2003), the USFWS (2004) estimated an overall loss of older forests from all causes on federal lands within the range of the northern spotted owl of approximately 5% (0.57% per year; 2% due to logging, 3% due to fires). However, this same report showed losses on federal land in Oregon declining by 8.5% over the last ten years, with highest (21.76%) declines in southwest Oregon. Moreover, landscape change detection analysis of the Klamath-Siskiyou ecoregion in southwest Oregon and northern California over a 30-year period (1972-1992) indicated that logging on non-federal lands was about twice as great, yielding smaller patches of intact forests, than on federal lands in general (Staus et al. 2002). Subsequent analysis within a smaller area (10 mile radius) surrounding the Cascade-Siskiyou National Monument in southwest Oregon over a longer period (1972-2000) confirms a similar trend of higher rates of logging on private lands (DellaSala unpublished report submitted to the BLM as part of scoping comments on the Cascade-Siskiyou National Monument management plan). Consequently, protecting mature forests on federal lands is crucial to the integrity of older forests throughout the region.

NORTHERN SPOTTED OWL RECOVERY

The northern spotted owl (NSO) is a distinct subspecies of the spotted owl that is found from southwestern British Columbia, through western Washington and Oregon, and down into northwestern California. The most notable characteristic of this bird is its strong association with LS/OG forests (Forsman et al. 1984).

This habitat requirement, paired with extensive logging of these commercially valuable forests, resulted in a drastic decline in owl numbers and subsequent listing of the species as threatened

under the ESA in 1990. Since then there have been a series of scientific assessments and planning efforts to develop a conservation strategy for the owl, culminating in the NWFP in 1994.

Although the US Department of the Interior attempted to develop a recovery plan for the NSO in 1992, it was never adopted and there is still no formal plan in place (Courtney et al. 2004). When the NWFP was approved in 1994 it was touted as the "federal contribution to recovery" and simultaneously viewed as lifting the burden of owl conservation from non-federal lands and placing it squarely on federal lands, including BLM lands. Although an official recovery plan has not yet been adopted, these assumptions remain strong motivations for retaining the integrity of the NWFP. One of the requirements of the ESA is the development of a recovery plan that includes ways to revive listed species and specifies management of habitat that is critical to survival. In particular, reviving a species takes more than managing for minimums or minimum reserves.

According to an agreement approved by the U.S. District Court Judge Ann Aiken in Eugene, OR, the U.S. Fish and Wildlife Service (USFWS) will prepare an owl recovery plan before the end of 2007. This is particularly important as owl numbers continue to decline (steeper than predicted in parts of its range) due to a variety of factors: most notably the continued displacement and competition from the barred owl (*S. varia*) (Courtney, et al. 2004) and habitat loss primarily on non-federal lands (Strittholt et al. in review). Thus, any changes to the reserve network must be in compliance with owl recovery as determined by the USFWS and must consider cumulative impacts from land-management activities on federal and non-federal lands as well as natural losses to critical habitat (e.g., fires in LSRs as in the Biscuit fire area).

The Interagency Scientific Committee to address the conservation of the NSO (Thomas et al. 1990) proposed a two-part conservation strategy for the species involving (1) protecting suitable habitat to ensure the owl's long-term survival, and (2) research and monitoring to find ways of producing suitable owl habitat in managed forests. The ISC recognized the need for adequate amounts of breeding and dispersal habitat and recommended large blocks of habitat that could support a minimum of 20 pairs of owls with a maximum of 12 miles between habitat blocks to

allow for juvenile dispersal (as noted above). Moreover, silvicultural practices outside reserves were designed to maintain 50% of each quarter township with retention of trees 11 inches diameter-at-breast height (dbh) and with a minimum canopy closure of 40% to facilitate owl movements across large landscapes. The NWFP incorporated these findings in the development of a network of LSRs and managed landscapes that were designed to conserve existing late-successional forest conditions and all associated organisms.

In addition to providing large blocks of suitable habitat, LSRs are meant to facilitate the dispersal of juvenile owls from their natal territories, in the first instance by providing an opportunity for dispersal *within* the natal reserve, and secondarily by providing some reasonable expectation that owls may successfully disperse *among* reserves. Because BLM LSRs are scattered throughout western Oregon often in a checkerboard ownership pattern (see Figure 1), facilitating dispersal of key species such as owls may be problematic, especially if reserves are eliminated, reduced in extent or connectivity, or additional logging is permitted in them. In a study on radio-collared juvenile NSOs, 66% of owls dispersed 12 miles or less from their natal territory (Thomas et al. 1990). Distances between adjacent BLM LSRs, however, vary from 5-48 miles (mean = 18 miles as measured edge to edge between BLM LSRs), so in some cases the distance may be too great for owl dispersal especially if reserves are eliminated or if LS/OG cutting is increased on non-federal lands. However, most LSRs are adjacent to other federally protected lands that collectively provide suitable dispersal habitat over the larger planning area. In more isolated LSRs such as those in the Coos Bay District, coordinated management across federal and non-federal ownerships is essential to ensure connectivity and dispersal habitat (discussed below and by Thomas et al. 1990).

Based on our analysis, mature- and old-growth forests on BLM lands, including LSRs, contain significant amounts of potential habitat for the NSO (Table 2). Western Oregon contains 3.7 million acres of owl critical habitat, 1 million acres (27%) of which is on BLM land. BLM LSRs contain nearly 600,000 acres of owl critical habitat—which is 58% of the suitable owl habitat on BLM land in western Oregon. Collectively, BLM LSRs contain 16% of the total NSO critical habitat in western Oregon and 25% of the critical habitat within the Coast Range (Figure 2a). These lands are critically important to survival and recovery of this federally threatened species,

as well as in meeting the goals of the NWFP. Moreover, we note that a major assumption made in the analysis of owl viability by agency scientists at the time was that BLM administered lands would be managed under a strategy equal to or superior to the ISC's strategy in providing for viability for the owl. The "high viability" rating for the owl was based on full implementation of the reserve system throughout the range of the owl, including BLM land (USDA Forest Service 1993 p. 115).

MARBLED MURRELET RECOVERY

Marbled murrelets are small coastal seabirds that live along the northern Pacific Coast of North America from Alaska to central California. The birds nest in mature and old-growth forests within 50 miles of the ocean. Due in part to substantial losses and modification of nesting habitat, populations in Washington, Oregon, and California were federally listed as threatened in September, 1992.

The recovery plan objectives are to stabilize population size at or near current levels by maintaining and/or increasing productivity and removing and/or minimizing threats to survivorship (Miller et al. 1997). The recovery team identified several actions that were needed in order to meet their objectives, including the development and protection of terrestrial and marine habitat areas within each of six marbled murrelet conservation zones.

Critical murrelet habitat was designated in May 1996 (U.S. Fish and Wildlife Service 1996). The USFWS identified 32 critical habitat units (CHUs) in Washington, Oregon, and California that were **essential** (emphasis added) to the conservation of the species. The majority of these areas were located on Federal lands and were almost entirely located in LSRs, as established in the NWFP (Miller et al. 1997).

Miller et al. (1997) clearly state that the NWFP, especially the LSRs, are the backbone of the murrelet recovery plan. Without LSRs (both USFS and BLM), it will likely be impossible to meet the goals of the recovery plan and may in fact accelerate the demise of this species.

In western Oregon, there are 1.5 million acres of marbled murrelet critical habitat—nearly 40% of the total critical habitat in the Pacific Northwest—mostly in the Coast Range. BLM land contains 485,000 acres (32%) of critical murrelet habitat, 83% of which is found within LSRs. Thus, BLM LSRs account for 27% of the total critical habitat for marbled murrelets in western Oregon (Figure 2b).

Because of their similar ecological requirements for old-growth forest, critical habitat for both NSOs and marbled murrelets overlaps in many areas along the coast—886,000 acres of overlapping habitat occur in western Oregon—making these areas particularly valuable for recovery of both species. Of this, 303,000 acres (34%) are found within BLM LSRs. The Coos Bay District is particularly important for murrelets and owls with 79% of BLM LSRs containing overlapping critical habitat (Figure 2c).

SURVEY AND MANAGE SPECIES

The survey and manage program of the NWFP was designed to protect rare, little known, species associated with mature and old-growth forests across the Planning area and ensure their viability. Approximately 400 species consisting of amphibians, bryophytes, fungi, mollusks, vascular plants, arthropods, and a mammal were included in this program due to concerns regarding viability and rarity (i.e. they did not have a high likelihood of persistence with continued timber management in older forests).

The survey and manage program was designed to complement the reserves: reserves would act as a coarse filter and survey and manage as a fine filter to ensure viability of hundreds of species (not just owls and murrelets). Scientists have recognized that fine filter approaches are needed in combination with coarse filters as a "back stop" to ensuring persistence of rare species in areas where logging and other habitat alterations are dominant activities (Noon et al. 2003).

A core principle of forest management under the NWFP, as recognized by FEMAT (1993), was the need to maintain or restore habitat conditions to support viable populations, well distributed across their current ranges of species known to be associated with old-growth forest conditions. At the time, FEMAT recommended 404 species and 4 arthropod groups that needed specific protection to ensure

persistence of the species in the Planning area that complemented the reserve network. FEMAT used a process based on ecological criteria and expert panels (mostly university and agency experts) on the make up of the survey and manage list initially assessing 1,120 species but narrowing the list to around 600 that remained of concern, and 404 species that were included in the survey and manage mitigation program. This list was chosen as species most likely to have viability problems under intensive timber management.

In general, the collection of survey and manage species recognized by FEMAT is an example of where the sum of the parts maintains functioning ecosystems. Many of these species perform vital roles in nutrient cycling, pollination, predation, control of destructive insects, and are prey for other species. Of the 404 survey and manage species recognized in the NWFP, 149 species are known to occur on BLM land and 93 are known to occur within BLM LSRs. LSRs in the Salem BLM District contain the highest known concentration of these species (54), followed by Roseburg (39) and Coos Bay (35). Examples include red tree vole, an important food source for NSO, and many species of vascular plant, mollusk, lichen, fungi and bryophyte (Appendix B). In addition to the survey and manage species, BLM LSRs harbor 22 species ranked globally critically imperiled or imperiled (G1/G2) by NatureServe and 58 species ranked critically imperiled or imperiled (S1/S2) in the state of Oregon.

CONNECTIVITY AMONG RESERVES AND PROVINCES

A fundamental principle of conservation biology inherent in reserve design is the maintenance of functional connectivity among reserves and across large geographic regions (sees Noss and Cooperrider 1994, Lindenmayer and Franklin 2002 for reviews). Connectivity among reserves allows the movement of wildlife across the landscape, facilitating dispersal. Connectivity among provinces (or inter-regional connectivity) allows for gene flow among related populations (i.e., "meta populations"), thereby lowering extinction risks (see Noss and Cooperrider 1994 for review).

Reserves - BLM lands, in general, are highly fragmented due to a checkerboard ownership pattern created by the O&C lands (see Figure 1) and exceptionally high road densities (see Figure 7), making dispersal among reserves difficult for a number of wide-ranging species. These fragmented areas are ecologically compromised yet remain essential to the integrated

network reserve design of the NWFP. Fracture zones (breaks in connectivity) are most likely to occur when reserves are spaced by more than spotted owl dispersal distances (i.e. 12 miles) due to roads, clearcuts, and other human disturbances (towns). As noted above, distances between adjacent BLM LSRs, vary from 5-48 miles and therefore in some cases (particularly in the Coast Range) the distance may be too great for owl dispersal especially if reserves are eliminated or if LS/OG cutting is increased on non-federal lands. Effective coordinated management is needed across federal and non-federal ownerships to facilitate connectivity within recognized fracture zones (e.g., reserves adjacent to private lands – see Figure 3, and reserves in highly roaded landscapes – see Figure 7).

Provinces - in general, BLM lands in western Oregon have long been regarded for their pivotal role in connectivity between the Coast Range and the Cascades, as well as in southwest Oregon linking the Klamath, Coast, and Cascade Provinces (Thomas et al. 1990). In fact, according to a government report (USDA Forest Service 1993) on viability assessments for old-growth associated species, BLM lands "presently and potentially, provide integral links between the Klamath, Oregon Coast Range, and Oregon Cascades West Physiographic Provinces ...and bridge gaps between National Forests in the physiographic provinces of Oregon. ... <u>There are simply no mitigating options that fully compensate for the habitat that may be lost on Bureau of Land Management administered lands (emphasis added)</u>" pp 158-159.

There are significant connectivity problems (fracture zones) between certain provinces such as the Oregon Coast Range and the Oregon Cascades that are separated by the Willamette Valley, and along the coast, particularly in the Coos Bay BLM District where large gaps between federal lands are filled with private industrial forests (see Figure 3). If BLM lands are not used to provide connectivity at this scale, the consequences for species like the spotted owl could be dire, because populations could be come isolated within provinces or even among reserves, thereby making them far more vulnerable to stochastic events like large fires and volcanoes. Additionally, given the owl's declining status in Washington, as well as the extent of clear cutting on the Olympic Peninsula and across southwest Washington, owl habitat in Oregon is ever-more important to functional connectivity in a tri-state area. In particular, the Willamette Valley is a key corridor for owls dispersing north and south (so is the Coast Range), and the

southern owls are critical for population exchange vis-à-vis northern California. Consequently, the lack of habitat in Washington makes habitat in western Oregon all that more important to the viability of the species across a tri-state region.

The elimination of or reduction in reserve protections pose the following problems for connectivity at the scale of provinces:

- The Oregon Western Cascades province is the heart of the current range of the spotted owl. This is where spotted owls have their highest numbers and greatest likelihood of long-term persistence. BLM lands play an important role in maintaining owl populations in this province, and hence providing the best stronghold for this imperiled species. BLM lands are located primarily in the western edge of this province in a checkerboard mixed with private lands. If BLM were to abandon the reserve system in this province it would cause significant adverse impacts.
- The effective size (i.e., habitat suitability) of the Western Cascades province would shrink, because the checkerboard would progressively lose suitable owl habitat. Based on principles of conservation biology (as noted by the ISC and FEMAT), a smaller effective province is less able to support imperiled species because they are exposed to relatively more risk from stochastic events such as large fires and volcanism, which are not unheard of in this province.
- Loss of habitat along the western edge of the Western Cascades province would limit connectivity to other provinces. The Willamette Valley is already a significant barrier to east-west movement of owls and other late successional species. Loss of habitat on BLM lands in the Oregon West Cascades will further exacerbate this problem.
- BLM lands in the Western Cascades province tend to be lower elevation and higher site productivity, so their capacity for restoration is great. Allocating this site potential to timber production at the expense of late-successional habitat represents a significant lost opportunity for restoring owl habitat. Spotted owls have been found to favor lower elevation, high productivity sites, so BLM's lands in this province are acre-for-acre relatively more important than Forest Service lands.

- BLM lands in the Oregon West Cascades also provide habitat for ESA-listed salmon (as noted below) that will experience degraded habitat conditions under increased logging.
- The Oregon Coast has somewhat limited federal ownership and a history of intensive forest management resulting in severely degraded habitat conditions and imperiled species, including spotted owls, marbled murrelets, and several ESUs of Pacific salmon (see below).[1] The NWFP recognized the critical need for restoration as it provides essential capacity for recovery (due to inherently high site productivity.) The remaining old forests on BLM lands in the Coast Range province provide essential habitat for a suite of imperiled species (see survey and manage section for examples), as well as forming the building blocks for future recovery. If BLM abandons the reserve system in the Coast Range the following risks will be assumed:

    i. The recovery of ESA-listed species becomes difficult if not impossible. BLM lands harbor a significant fraction of the remaining habitat for marbled murrelets, spotted owl, and salmon. If this habitat is logged and if restoration is not implemented, recovery is likely forgone, and the risk of extinction rises significantly.

    ii. Loss of habitat on BLM lands in the Coast Range severely limits both the effective size of the province and the effective connectivity to other provinces resulting in isolation of imperiled populations on a few blocks of Forest Service lands. Principles of conservation biology highlight the risks of such isolation.

    iii. The Coast Range province has a number of undammed watersheds and a high capacity for restoration of aquatic ecosystems and listed fish. Abandoning the reserve system will forgo the opportunity for restoration.

    iv. The Coast Range is comprised of very steep and highly dissected landforms that are prone to erosion and landslides. Loss of the reserves will increase problems with landslides and chronic sedimentation from additional logging.

[1] "Because it is relatively cutover and relatively isolated from other forested areas, the Coast Range Province has been identified as an area of concern for spotted owls, marbled murrelets, and anadromous fish." FEMAT IV-7.

Notably, the Oregon Klamath province contains one of the most biodiverse conifer ecosystems in the world with a high incidence of endemic species (DellaSala et al. 1999). This province is a biological cross-roads linking several other provinces, including Oregon Coast Range, Oregon Western Cascades, California Klamath, California Coast Range, and California Cascades. USFWS (2004) reports that more than 20% of the remaining spotted owl habitat was logged over the last ten years in this region alone. Adverse impacts expected from the loss of reserves here would include:

- Habitat in this province is naturally fragmented by poor soils, dry climate and fire history. With increased logging, the naturally fragmented habitat blocks would become even more fragmented or lost entirely.
- BLM lands managed by the Medford BLM cover a very large portion of this province in which there is very little National Forest ownership. Loss of protection for old forests managed by BLM would dramatically shrink the effective size of this province.
- Connectivity within this province and among adjacent provinces would be compromised.
- Many areas within this province are derived from granitic parent material, resulting in high erosive soils. Loss of protection in the reserves will increase problems with chronic sedimentation.
- Many areas of this province have low site productivity so loss of habitat will have long-term consequences.
- This province contains the Zane Grey Wild Area, the largest forested roadless area managed by BLM in the entire contiguous U.S. (see below). Loss of protection for this area along the Rogue River will have national significance.
- This province also contains many undammed watersheds in close proximity to the ocean, so it has a high inherent potential for aquatic restoration.
- The area of special concern identified in the Coast Range province of Oregon includes all forested lands north of State Highway 38 and west of Interstate 5 to the Columbia River, a forested land area of about 4.1 million acres. Within this area, the known owl population is extremely low compared to other areas in the State. Existing data indicate

> 102 known pairs of spotted owls in the entire area, a density of only 0.015 pairs per square mile. This density is only 1/8 that recorded in a study area in the Coast Range outside the area of concern. This low density parallels an equally dire scarcity of suitable owl habitat. Most of the forest is <80 years old. The remaining areas of older forest are scattered across the landscape, and are becoming increasingly isolated [FEMAT 1993 p 67].

Finally, the Willamette Valley was historically a mix of lowland coniferous and broadleaf forests and native prairies that have now been largely converted to agriculture and urban uses (FEMAT 1993 p IV-7). This province never supported large populations of spotted owls, but it almost certainly provided far better dispersal habitat than it does today. There is very little federal land in this province, so in order to compensate for the loss of connectivity through the province it is critically important to maintain high quality owl habitat on the BLM lands that fringe the valley so that some semblance of connectivity remains.

Because LSRs contain LS/OG habitat that meet the requirements of BLM's "Forest Reserves" and based on the above findings, we recommend that all LSRs with LS/OG receive this special designation as part of BLM's National Landscape Conservation System (NLCS) program and managed for connectivity. BLM created this designation for older forests that could come under the protections of the NLCS network. We note that according to BLM, "the Forest Reserve designation was established primarily to protect and help recover populations of threatened and endangered species as well as additional species of old-growth ecosystems that may become listed in the future" (http://www.blm.gov/nlcs/summary_tables.htm#forest).

COORDINATION WITH NON-FEDERAL LANDS (HCPs)

As recognized in the ISC Report (Thomas et al. 1990), "the long-term occupancy of those [non-federal] sites probably depends on their proximity to Forest Service and BLM lands with suitable owl habitat." Therefore, elimination of reserves on BLM lands will not only threaten the ability of Forest Service lands to support owls and meet legal mandates, but it will also undermine the ability of non-federal lands to support owls. Consequently, BLM should consider the effects beyond their own ownership.

In the Coos Bay District, there are two large parcels with HCPs located between two isolated BLM LSRs that are meant to increase habitat connectivity and complement management within the LSRs: the privately owned Weyerhaeuser-Millicoma and the Elliott State Forest. Collectively, these parcels increase the potential dispersal area (mainly north-south connectivity) for northern spotted owls and marbled murrelets by 309,000 acres (Figure 3). They are also important to coho salmon, tripling the spawning and rearing habitat in the District and increasing the rearing and migration habitat ten-fold (Figure 4).

Both HCPs include management prescriptions to aid in the recovery of owls and murrelets. Specifically, the Weyerhaeuser Corporation agreed to maintain relatively low quality "dispersal habitat" of 209,000 acres on their Millicoma Tree Farm consisting of areas of forest large enough to sustain spotted owl groups and close enough together to allow for juvenile dispersal. Elliott State Forest HCP (Oregon Department of Forestry 1995) allows for the incidental "taking" of northern spotted owl and marbled murrelets on 93,000 acres in exchange for mitigation measures to enhance habitat features for owls and murrelets such as varied harvest rotations, establishment of habitat conservancy areas and riparian reserves, research, monitoring, and adaptive management (Oregon Department of Forestry 1995 – now in revision).

In general, HCPs are meant to provide regulatory relief for non-federal landowners where permits are issued by the USFWS for "taking" endangered species and/or habitat under provisions of the ESA in exchange for limited protections on such lands. Although Congress initially intended HCPs to promote recovery of listed species, in many cases the process has become one in which the wholesale taking of endangered species is authorized in exchange for often inadequate "mitigation" rather than conservation (Shilling 1997). In a nation-wide study of HCPs, Kareiva et al. (1999) documented numerous inadequacies in western forest HCPs, including the taking of 100% of the threatened/endangered species' populations or habitat in 30% of HCPs, failure to provide sufficient mitigation measures in 43% of HCPs, and irreversible impacts on the threatened/endangered species' habitat in 81% of HCPs.

Unfortunately, the Weyerhaeuser-Millacoma HCP is an example of the particular deficiencies noted with HCPs by researchers. For instance, according to a study by the American Lands Alliance (2000), this HCP allowed the unmitigated loss of 16,275 acres of owl habitat, 35 spotted owl nest sites on the property, 27 owl nest sites partly on the property, and 5 single spotted owls representing 100% of the owls and primary owl habitat across this ownership. Clearly, this plan appears to work against the recovery of owls and the intent of the ESA, especially if it is combined with reserve eliminations or reductions on adjoining federal lands.

Likewise, the Elliott State Forest HCP has experienced similar implementation problems. This HCP has allowed the Oregon Department of Forestry to take 43 owls over a 60-year period if habitat for 26 owls was protected (Oregon Department of Forestry 1995). According to the HCP, there were 35 known sites with resident owls on or within 1.5 miles of the Elliott State Forest as of September 1993, for a total of 69 individual owls. However, in a survey undertaken just five years later, only seven pairs plus a few single owls remained (Glenn et al. 2000) suggesting that the current management is not aiding in the recovery of this species. But instead of revising the HCP to better provide for owl needs, the Forest is currently proposing to increase timber outputs while decreasing protection for marbled murrelets that also nest in this area.

Compliance problems with HCPs are particularly problematic because the federal government has identified Elliott State Forest as a crucial link for the continuing viability of threatened species in this area. The South Coast-Northern Klamath Late Successional Reserve Assessment (LSRA; USDI BLM 1998) notes that "LSRs . . .were designed as a network of interconnected reserves" and warns that in the area of the Elliott State Forest, "there is a high risk of the Coast Range Province becoming isolated due to the few weak and tenuous links to adjoining provinces."

The LSRA identifies Elliott State Forest as key to owl habitat management and connectivity:

> "In general, the Millicoma HCP is designed to provide only dispersal habitat for the northern spotted owl. In contrast, the Elliott State Forest will provide not only dispersal habitat for owls, but also suitable nesting habitat for owls and marbled murrelet. Individuals from the

Elliott State Forest are expected to interact with individuals in the adjoining LSRs. The Elliott State Forest will also provide a system of reserves, long rotations, and structural components such as snag and down wood retention to help facilitate movement of low-mobility late-successional species across the landscape through time."

For the NWFP to be deemed legally acceptable it was assumed that federal lands would provide the "backbone" for listed species recovery while freeing up non-federal lands for timber production. However, given increased interest in timber harvest on State and private lands and the HCP implementation deficiencies noted above, any action by BLM to remove or reduce the reserve network on its lands is likely to significantly lower persistence of listed species as the reserve network would fall below minimum thresholds needed for recovery particularly when combined with HCP failures on adjoining non-federal lands. Conversely, non-federal lands will need to be managed with enhanced protections if BLM is to assume a reduced role in endangered species protections.

We also note that under the provisions of the O&C settlement agreement with the O&C plaintiffs, it is assumed that "*a larger burden would fall on the Forest Service to meet the ecological objectives of the NWFP*." Thus, any decision to eliminate or reduce reserves on BLM lands, must be accompanied by substantial additions to the reserve network on Forest Service lands possibly through the transfer of BLM O&C lands (at a minimum, reserves, endangered species habitat) to the Forest Service. BLM should analyze such an alternative as it appears more consistent with the intent of the NWFP and ESA than the elimination or weakening of its reserve network to accommodate timber production.

SALMONID EVOLUTIONARILY SIGNIFICANT UNITS

The majority of fish listed as endangered and threatened under the ESA are Pacific salmonids. Due to their unique life histories, they are listed as Evolutionarily Significant Units (ESUs) defined by the National Marine Fisheries Service based on known fish distribution and migration blockages. Consequently, we used salmon ESU datasets to investigate the role of BLM LSRs in protecting native salmon habitat in western Oregon (Table 3). ESU polygons depict major basins

within the current known range of each ESU and were limited to just those that have been federally listed as containing a threatened or endangered salmonid. There are three species of salmonids with ESUs in western Oregon: coho, chinook, and steelhead.

Coho

Coho salmon have been the most important variety of salmon caught commercially in Oregon and until recently were also the most common variety in most coastal streams. However, numbers have declined in recent years by 90% from historic populations. Thus, it is critically important to protect and restore remaining habitat within Oregon. The largely undammed watersheds of the Oregon Coast Range represent a unique salmonid restoration opportunity without many of the challenges found in the heavily managed Columbia River system.

The Oregon Coast ESU has a status of "proposed threatened." Although it was originally listed as threatened in August, 1998, this ESU lost its status in a Ninth Circuit Court decision in 2004. As of June 16, 2005, the National Oceanic & Atmospheric Administration (NOAA) has extended its listing decision for this ESU while it conducts further scientific review. We therefore included coho in our analysis because of the economic importance of the species and because it has been listed recently and remains "proposed" for relisting.

There are 1.8 million acres (total) and 650,000 acres of coho ESU area on BLM lands and LSRs, respectively, in western Oregon with LSRs representing 35% of the ESU area on BLM lands (Figure 5a). Of the 6,297 miles of spawning and rearing habitat within western Oregon, 12% of it is located on BLM lands, 44% of which is within LSRs (also see Figure 4 and Table 4).

Chinook

There are two chinook ESUs in Oregon that are listed as threatened in western Oregon: Upper Willamette River and Lower Columbia River—both were listed on March 24, 1999. As such, there are 370,000 acres of chinook ESU area on BLM land in western Oregon and 16% of BLM land in western Oregon contains chinook ESU areas. Notably, one half of the BLM lands in Salem and Eugene districts contain chinook ESU habitat. Further, there are 63,000 acres of chinook ESU areas within BLM LSRs—17% of the total ESU area on BLM land (Figure 5b).

Steelhead

The Upper Willamette River and Middle Columbia River ESUs were listed as threatened in March 1999. NOAA has since updated the status reviews for these ESU's, and has extended its listing decision for steelhead for 6 months while it conducts further scientific review. Given the commercial importance of this species and consideration for potential future listing, we included it in our analysis. There are 218,000 acres of steelhead ESU area on BLM land in western Oregon, all of which is found in the Salem and Eugene districts. Nine percent of BLM land in western Oregon contains steelhead ESUs. There are 35,000 acres of steelhead ESU area within BLM LSRs—16% of the total ESU area on BLM land (Figure 5c).

KEY WATERSHEDS

Key Watersheds are a system of large refugia crucial to at-risk fish species and provide high-quality water. These watersheds are especially important in maintaining favorable stream flow, a key provision of the O&C Act as well as other applicable laws (e.g., Clean Water Act). To ensure wide distribution across the landscape, a total of 164 (143 Tier 1, 21 Tier 2) watersheds were designated by FEMAT based on professional judgments as to historical fish use, current habitat quality, and the potential for future restoration. Due to their importance for native salmonids, Key Watersheds, are supposed to be top priority for restoration of watersheds integral to endangered fish habitat (USDA Forest Service 1994b).

Based on our analysis, western Oregon contains 3.9 million acres of Key Watersheds, 154,000 acres (4%) of which are located within BLM LSRs (Figure 6). In the Coast Range, LSRs protect 9% of Key Watersheds overall, encompassing over 25% of 10 of the 38 Key Watersheds in this area. Thus, in recognition of the special values provided by these watersheds, we recommend that the BLM inventory those containing salmonid ESUs for potential inclusion in future Wild and Scenic designations. Examples of areas that likely qualify for such designations include the Elk River watershed along the southern Oregon Coast and the Jenny Creek watershed within the Cascade-Siskiyou National Monument.

RIPARIAN RESERVES

Riparian areas are "hotspots" of biodiversity throughout the West. While these habitats occupy as little as 0.5-2.0% of the landscape in the Pacific Northwest, they contain disproportionately high levels of plant, mammal, bird, and amphibian species in comparison to surrounding uplands. Of the 593 species that occur in Oregon and Washington, 319 (53%) use riparian areas (Kauffman et al. 2001). Riparian areas, in general, have been impacted by land-use practices (most of them have been cumulative), including logging (especially high grading of large trees), livestock grazing, water diversions, wetland drainage, mining, over-fishing, and road building. Logging in riparian forests is likely deleterious to more habitats and wildlife species than logging in any other forest type in the Pacific Northwest (Kauffman et al. 2001). Logging not only impacts wildlife habitat but can reduce water quality through siltation and associated increases in stream water temperatures due to loss of shade (Beschta et al. 1987, Beschta et al. 2004). When the NWFP was approved only about 31% of Riparian Reserves included old-growth forest (FEMAT p IV-54) and thus restoration should be the main objective of management within these areas.

Riparian Reserves are one of four principal components that form the basis of the NWFP aquatic protection scheme along with Key Watersheds, watershed analysis, and watershed restoration. As such, the riparian reserve system is meant to provide dispersal habitat for spotted owls as well as suitable habitat for numerous other species and water quality management for aquatic systems. Riparian Reserves are lands along streams and unstable or potentially unstable areas, and are meant to help maintain connectivity and thus improve travel and dispersal corridors for terrestrial animals and plants that depend on riparian habitat. They were defined by FEMAT (1993) by applying buffers of various widths to all streams found on National Forest and BLM lands within the range of the northern spotted owl. Fish-bearing streams are buffered by the average height of two site potential trees or 300 feet, permanently flowing non-fish bearing streams were buffered by the average height of one site potential tree or 150 feet, and intermittent streams were buffered by the average height of one site potential tree or 100 feet.

Riparian Reserves have not been mapped by the BLM and consequently it was impossible to assess impacts from any proposed logging. However, in general, based on the above literature,

Riparian Reserves should be protected as habitat and dispersal corridors for associated species and to contribute to the proper functioning and maintenance of water quality and stream flow.

ROADS AND ROADLESS AREAS

Ecological impacts of roads on forest ecosystems are pervasive, and include fragmentation of intact ecosystems, erosion and subsequent pollution of aquatic systems, direct mortality to animals from car collisions, and improved access to formerly pristine areas allowing the introduction of invasive exotics, illegal hunting or plant collecting, disturbance of sensitive organisms, OHV access, and fire (Conservation Biology 2000, Trombulak 2000, DellaSala and Frost 2001, Heilman et al. 2002). Many scientists believe that habitat destruction and fragmentation, such as that caused by roads, is the leading cause of species loss worldwide (Wilcove et al. 2000). Notably, the threshold for wildlife avoidance of roads, while varying from species to species and geographically, generally ranges from 1-2 miles/mi^2 for taxa such as salmonids (Lee et al. 1997, Jones et al. 2000) and large carnivores (Thiel 1985, Mech et al. 1988, Conservation Biology 1996).

Western Oregon is heavily roaded with approximately 113,000 miles of roads, 13,000 miles of which occur on BLM land. Despite their protected status, BLM LSRs contain approximately 5,330 miles of roads with road densities ranging from 0 – 12.5 miles/mi^2 (mean = 2.4 miles/mi^2; Figure 7). Thus, many of the reserves are highly fragmented by roads and well above road density thresholds for a number of wildlife species. These LSRs would benefit from additional road closures, OHV restrictions, and decommissioning of roads to increase functionality of the reserves for species sensitive to such disturbances. This is especially true for BLM reserves juxtaposed with non-federal lands as is the case for both the Weyerhaeuser and Elliot State Forest lands with active HCPs and very high road densities.

In contrast, roadless areas increase the functionality of ecosystems, providing many ecosystem services such as (1) refuges for threatened and endangered species, (2) old-growth forest and other rare habitats, (3) clean drinking water, (4) functioning reference areas for ecological research, (5) buffer zones against invasive species, and (6) areas for outdoor recreation (DeVelice and Martin 2001, Strittholt and DellaSala 2001, Loucks et al. 2003, Strittholt et al.

2005). In addition, because of their role in the recovery of threatened northern spotted owl and marbled murrelet, and because roadless areas act as "strongholds" for salmonids (Trout Unlimited 2004), the importance of protecting remaining roadless areas under BLM management cannot be overstated.

The BLM has not generally inventoried roadless areas on its western Oregon holdings, however, based on mapping of 1,000 acre unroaded areas provided by the Oregon Wild Forest Coalition there are 76 small unroaded areas totaling 105,000 acres within BLM LSRs and 268,181 acres of roadless areas spread over 146 areas across all BLM allocations. The majority of unroaded acreage is found within the Zane Grey Roadless Area located in the large LSR adjacent to Wild Rogue Wilderness and Siskiyou National Forest in the Medford BLM District (Figure 8). Zane Grey provides an example of a roadless area of high conservation importance on BLM O&C lands.

Zane Grey Roadless Area - the Zane Grey roadless area is named after the famed adventure author who kept a cabin alongside the Rogue River. The area is about 25 miles northwest of Grants Pass and includes twenty-four miles of the Wild and Scenic Rogue River.

Zane Grey is the largest forested BLM roadless area in the "lower 48" and has been nominated by conservation groups for future wilderness protections. Due to its steep slopes and elevations ranging from 400-3,800 feet, dozens of waterfalls cascade down the scenic canyon walls. Some of the best rafting in Southern Oregon is through the Zane Grey roadless area. On the south side of the river is the Rainy Falls Trail, which ends at the largest falls on the Rogue River proper, a popular spot to view salmon jumping the falls on their way to spawn. The Rogue River hosts a diverse array of fish species, including steelhead, coho and chinook salmon, and coastal cutthroat trout.

Peregrine falcon (*Falco peregrinus*), northern spotted owl, bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), cougar (*Felis concolor*), black bear (*Ursus americanus*) and Roosevelt elk (*Cervus elaphus*) are all known to inhabit the area. As many wildlife species use river corridors for migration, this area is a key wildlife corridor between the

inland habitat of the Rogue Valley and coastal forest habitat to the west. The Zane Grey roadless area is currently threatened by the Kelsey-Whiskey timber sale.

In light of the small size and relative isolation of existing roadless areas on BLM lands, the BLM should design management alternatives to include additional decommissioning of roads and OHV restrictions to increase the amount of roadless areas available for ecosystem and species protection. As such, we recommend BLM commence an inventory of roadless lands 1,000 acres and larger similar to the Forest Service RARE II process and then consider those lands as candidates for Wilderness Study Areas, Areas of Critical Environmental Concern (ACEC), and/or additions to the Wild and Scenic river system. At a minimum, the Zane Grey roadless area should be considered for designation as a Wilderness Study Area (and managed accordingly) as we believe it meets BLM's criteria for this special designation.

SOCIAL AND ECONOMIC OBJECTIVES: AN ALTERNATIVE

The NWFP estimated a Probable Sale Quantity (PSQ) of 958 million board feet (region-wide and for both Forest Service and BLM lands) to be logged from the Matrix and the AMAs over the first decade of the Plan. Another 100 million board feet, not considered as merchantable, was estimated to be produced annually from the Matrix and AMAs (note: under the Plan, harvest volume from reserves does not count toward the PSQ on federal lands). Subsequent to the promulgation of the Plan, the PSQ was adjusted downward to 805 million board feet based on adjustments to Riparian Reserves and individual Forest Service and BLM District RMPs. The actual PSQ for BLM O&C lands has fluctuated annually both before and during the NWFP from 500 million board feet annually in 1937 to 1.185 billion board feet per year in 1983 and 211 million board feet in 1994 (as prescribed under the NWFP); however, BLM in 1999 harvested 174 million board feet from O&C lands (USDA Forest Service and USDI BLM 1999). Fluctuations in timber volume are due to many factors, including market forces (especially demand for wood products), logging practices, and compliance with environmental laws and regulations. Moreover, the PSQ during promulgation of the NWFP was meant to be "a best estimate," of timber volume that was predicted to be available when the ecological objectives of the Plan were met (i.e., it was not meant as a "promise" or a "guarantee").

As the O&C settlement requires the BLM to consider additional volume to fulfill the timber objectives of the NWFP, we provide an alternative for BLM to consider that seeks modest timber volume through thinning of small trees (<80 years) consistent with the ecological objectives of the NWFP. As required by FLPMA and NEPA, BLM should develop an alternative that recognizes the broader values of the reserve network to endangered species protections, proper stream flow and water quality, and biodiversity conservation and includes restorative actions such as fuels reduction treatments, road decommissioning, and riparian restoration treatments. Here, we provide an example of potential volume available on BLM lands without having to log mature and old growth trees.

The potential timber harvest volume estimates (Table 5) provided in this report are a simple estimate of volume available from a one time entry for purposes of variable-density thinning (i.e., thinning to promote stand heterogeneity by varying the density of trees at various scales both within and between stands while incorporating substantial "skips" and small gaps). We did not attempt to calculate a sustained yield, which would require detailed information not available to us on site conditions, expected rates of growth and mortality, and long-term management objectives. Our estimates are based on reasonable expectations of average stand conditions, however, they would need to be adjusted geographically as large differences in timber volume are anticipated in wet areas on low-elevation, productive soils (e.g., Coast Range) in contrast to drier inland areas of lower site productivity (e.g., portions of the Roseburg and Medford Districts). Further, in recognition that not every acre can or should be treated, the volume estimate was adjusted down (by 75%) in order to account in a generic way for Riparian Reserves (which BLM has not mapped and which may need to be treated differently or not at all), sensitive slopes, sensitive wildlife habitat, and areas that lack road access. Based on these assumptions, we estimate that approximately 1.6 billion board feet of young trees (<80 years) are available from the Matrix and AMAs and an additional 717 million board feet from LSRs (Table 5, Figure 9). This volume can be offered over an extended period of time to allow for sustained production on O&C BLM lands without compromising LS/OG habitat or the intent of the NWFP. In addition, given that the LSRs do not contribute to PSQ levels (as the volume from LSRs is not sustainable without compromising the reserve network as recognized by FEMAT),

the BLM could get significant timber volume through small-tree thinning in the Matrix and AMAs without having to compromise the integrity of LSRs or their surroundings.

Finally, as noted, researchers have documented that Wilderness, National Parks, and roadless areas yield positive economic benefits to communities, including those in rural areas. A study of 410 western counties over a ten-year period indicated that the degree of protection at the county level was positively correlated with growth in employment and income especially in counties with relatively high percentages of federally protected lands (Southwick 2000, Sonoran Institute 2004). These reports verify a connection between the prosperity of Western communities and the vast, publicly owned open spaces that surround them. Thus, BLM should consider the economic value reserves provide to local communities in the form of non-consumptive uses, hunting, and fisheries and how such contributions help rural communities transition to sustainable economies. Conversely, BLM should consider the diminished ecosystem services and associated economic impacts of increased logging, particularly within reserves.

SUSTAINABILITY AND THE NWFP

The NWFP was instrumental in shifting federal lands management from the inevitable elimination of old-growth forest ecosystems (and associated species) from all but a few scattered areas across the region, toward principles of ecosystem management inherent to sustainability. Arguably, the Plan has neither met its conservation nor its timber objectives as evident by the continued decline of the northern spotted owl and salmonid populations, and timber targets that have been cast as a "broken promise" by the timber industry. It is conceivable that the NWFP timber outputs (PSQs) were overly optimistic and cannot be fulfilled without compromising other forest values in which the public places a high degree of value on, including old-growth forests, threatened species, clean drinking water, and back-country, roadless experiences. Paradoxically, the agencies are facing unrealistic timber targets on lands that were largely overcut decades ago with the result today that less than 20% of the historic old-growth forests remain (Strittholt et al. in review). An example of this can be clearly seen in Figure 9 whereby logging of remaining mature and old-growth forests on BLM lands would further fragment older forests in what is already a highly fragmented system due to the checkerboard ownership pattern and numerous fracture zones noted. Under continued or stepped up logging on BLM lands as

well as non-federal lands, it is likely that the persistence of old-growth associated species (e.g., murrelets, spotted owls, salmonids, vulnerable survey and manage species) will be placed in jeopardy. Further, by considering the elimination or reduction of reserves and/or by proposing increased logging of older trees within them, the BLM is unlikely to achieve broader measures of sustainability, as species tied to mature and old-growth forests generally require the older trees in the forest of highest commercial value.

As demand for wood products in the U.S. escalates and reliance on imports rises, land managers are faced with difficult decisions on how best to achieve sustainability in an increasingly tense climate of natural resource conflicts on public lands. Principles in ecosystem management, along with recent advances in landscape ecology, provide tools for agencies to institutionalize sustainability as a fundamental operating principle on federal lands. In particular, sustainable timber management and conservation of natural resources can be compatible goals, essential to healthy landscapes (Lindenmayer and Franklin 2002). While the O&C Act did not define sustainability, the Act does include provisions for multiple use management as safe guards for ensuring timber production does not compromise other forest values. In fact, the O&C term "forest production" interpreted in today's climate means more than timber volume and includes multiple natural resource objectives related to watershed health, carbon sequestration, fish and wildlife habitat, recreation, endangered species, and other values inherent to BLM lands that also contribute to community stability. The O&C Act also called for sustained yield, not as an end in itself, but rather to meet a variety of purposes, including timber supply, community stability, watershed protection, favorable conditions of water flow, and recreation facilities. Clearly, this is multiple use, not timber dominance. BLM's view of the O&C Act being a "dominant use" mandate (as reflected in scoping meeting discussions) is therefore overly narrow in scope. Further, the concept of sustainability has evolved greatly since the 1937 legislation was enacted and the BLM 1995 RMPs were approved. In particular, three lines of evidence shed light on adapting broader concepts: (1) definitions of sustainability provided by FLPMA are more comprehensive than the O&C Act and ensure dominant use does not compromise other values; (2) scientific advances in ecological sustainability call for sustaining a broad suite of forest outputs (see Journal of Forestry 1999 Vol. 97 No. 5 for relevant papers on this topic); and (3) the

economic value provided by protected areas and healthy ecosystems are many and contribute to community stability over time (Southwick 2000, Sonoran Institute 2004).

IMPORTANCE OF BLM LANDS: FINAL RECOMMENDATIONS

Lands administered by the BLM in western Oregon make up a key portion of the public lands in this area and contain significant amounts of old-growth and mature-forest habitat essential to the recovery of federally listed species and the health and integrity of the larger region. BLM LSRs contain a significant portion of this habitat (i.e., are the "backbone" to species recovery) and thus are integral in the management and recovery of hundreds of old-growth associated species and native salmonids. In particular, LSRs in the Coast Range are especially important as they provide the only suitable habitat on publicly managed lands for large stretches, especially in the Coos Bay District. Likewise, the western edges of the Roseburg and Eugene Districts and nearly the entire Medford District and the southern end of the Roseburg District are vital linkages between the Coast and Cascade Ranges. These lands are essential to regional connectivity as logging and road building has eliminated nearly all mature and old-growth forest throughout the region (Staus et al. 2002).

The revision of BLM forest plans could leave 1.6 million acres of critical habitat for spotted owls, murrelets, and salmon unprotected. In addition, given that such changes are taking place within a larger (cumulative) context of declining protections on both federal (e.g., survey and manage reductions, Aquatic Conservation Strategy rollbacks, logging within burned LSRs), proposed land transfers (Coos Lower Umpqua Siuslaw Tribes' proposal to acquire 62,000 acres of the nearby Siuslaw NF), and increased logging on non-federal lands (e.g., HCP violations and reductions on the Elliott State Forest and Weyerhaeuser lands), the cumulative effects of such actions pose significant problems for threatened species that, taken in context of new threats such as the barred owl and West Nile virus, may push the species over an extinction threshold. This is especially important given that listed species (murrelets, owls) already are being managed under "minimum" reserve requirements as recognized by Judge Dwyer's decision to allow the NWFP to go forward. The reserve network on federal lands was considered by FEMAT as a bare minimum necessary to meet legal requirements. Although not yet functional, the reserve network was necessary to allow non-federal lands to "take" threatened species and

habitat under provisions of the ESA. Thus, eliminating or weakening protections for BLM LSRs and Riparian Reserves not only would jeopardize habitat for listed species, as well as hundreds of others associated with older forests, but it calls into question the legality of HCPs on non-federal lands. Consequently, in order to address ecological objectives of the NWFP, Clean Water Act, and ESA, in the context of the O&C settlement, we recommend the following be considered in all BLM alternatives:

- **Maintain or expand existing LSRs and Riparian Reserves and their protective status.** The network of reserves on federal lands is grossly inadequate, as a large fraction of the reserves are of plantation origin and losses are expected to the reserve network overtime due to stand replacing fires in some areas (note FEMAT assumed it would take at least a century for the reserve network to attain late-seral condition – i.e., to be fully functional). Additional losses are expected on non-federal lands where logging of mature forests continues (at much greater rates than federal lands) and where HCPs are not meeting recovery goals. The NWFP provides opportunities for managing reserves to achieve late-seral conditions and thus management should focus on thinning-from-below (trees <80 years old) in fire-suppressed forests to increase stand resiliency (mainly in the drier forests in the Roseburg and Medford districts) and in over-stocked plantations. In addition, the reserve network should be expanded within the Coast Range, which is heavily fragmented and contains significant overlapping habitat for both spotted owls and marbled murrelets. This can be accomplished by incorporating more of the BLM matrix old growth within reserves, strengthening protections on non-federal lands to meet HCP objectives and recovery goals, or transferring BLM reserves to the Forest Service (see below). At a minimum, BLM reserves adjacent to HCPs should be given special designation as Forest Reserves, ACECs, or equivalent protections.
- **Transfer BLM lands to the Forest Service**. If BLM is incapable of meeting the ecological objectives of the NWFP, the agency should transfer its lands to the Forest Service to be managed in an integrated manner under the Northwest Forest Plan.
- **Inventory and manage BLM roadless areas, LSRs, ESU habitat, Key Watersheds, and Riparian Reserves for special designations.** BLM should study these areas for consideration as Areas of Critical Environmental Concern, Botanical Areas, Wilderness Study Areas, Research Natural Areas, Forest Reserves, and Wild and Scenic corridors

and manage them to maintain their special character until they can be designated. Examples include Elk River, Jenny Creek, and Zane Grey Roadless Area.

- **Manage Riparian Reserves, Key Watersheds, and salmonid ESUs to achieve recovery and maintain adequate stream flow.** These areas, in particular, are essential for meeting stream flow provisions of the O&C Act and the Clean Water Act.
- **Conduct research on northern spotted owl and barred owl habitat needs.** Recent information on spotted owl declines indicates that barred owls have contributed to the demise of the threatened owl through competition and hybridization (Courtney et al. 2004). Research is needed to determine how these species separate niche space. This information may help tilt the competitive advantage to spotted owls, particularly if stand structure can be managed to accommodate spotted owls at the expense of barred owls and/or if management can improve spotted owl survival through refugia. Additional research is needed to determine if fire losses and associated salvage logging within LSRs (such as in southwest Oregon, Klamath Province) have reduced owl critical habitat and linkages across physiographic provinces.
- **Design thinning prescriptions to achieve fuels reduction and timber volume targets as needed.** Recent studies of fire behavior in managed forests indicate that plantations are at high risk of future fires due to continuous ground and near surface fuels amplified by high stand densities and logging slash (Odion et al. 2004). Thus, for federal agencies to achieve a sustainable yield of timber, plantations must be managed to reduce fire proneness and roads must be seasonally or permanently closed or decommissioned to reduce ignition sources (e.g., OHV access) in fire prone regions.
- **Use variable-density management prescriptions in Matrix and plantations.** Trees thinned uniformly on federal lands over several decades have contributed to conditions where plantations are species poor and fire prone (due to reduced stand humidity, high soil desiccation rates, high densities of small trees, and logging slash). Thus, land managers should adopt variable-spaced thinning to improve stand structure, generate volume in overly stocked stands, and manage for fuel discontinuities (Muir et al. 2002).
- **Examine cumulative actions of related federal and non-federal decisions affecting species associated with LS/OG forests**. This includes changes to "survey and manage" requirements, Aquatic Conservation Strategy; logging within fire recovering LSRs, HCP

deficiencies on non-federal lands, and proposed land transfers with Indian tribes - Coos Lower Umpqua Siuslaw Tribes' proposal to acquire 62,000 acres of the nearby Siuslaw NF (which are mostly reserves).

- **Design alternatives that seek timber volume through plantation and small tree thinnings**. Approximately 1.6 billion board feet of small trees (<80 years) is potentially available outside reserves with an additional 717 million board feet of small trees within LSRs. However, any increase in logging on O&C lands should be met with an equal reduction of logging on BLM public domain lands, Forest Service lands, and/or non-federal lands.

Although this report explored the potential for providing timber volume primarily from outside the reserve network, this does not mean that such lands should be treated only for commercial timber production. Actions outside reserves can impact their functionality through creating inhospitable conditions to species dispersing through the "matrix" (Lindenmayer and Franklin 2002). FEMAT (1993) recognized that a period of up to 100 years would be needed for the reserves to become functional, as younger forests were restored to older conditions over time. Elimination of reserves or reduced protections by BLM in the Planning area could trigger jeopardy decisions for listed species and viability concerns for others as the reserve network is: (1) primarily made up of non-LS/OG forest, much of which is young, previously managed forests (not yet functional as LS/OG); (2) considered the bare minimum to meet ESA criteria; and (3) the backbone for maintaining viable populations of mature and old-growth species on federal and non-federal lands.

The Northwest Forest Plan was an historic shift in federal lands policy that helped to propel the BLM into the 21st century of ecosystem management and biodiversity conservation. The Plan was developed across a tri-state region where the reserve network over time would avoid the need to list species, trigger jeopardy decisions, and shut down the timber program on federal lands with implications to non-federal lands as well. Oregon BLM lands are an integral component of the reserve network and to the ecological assumptions of the NWFP throughout this region. If any part of this integrated network, considered a "keystone" ecological objective by FEMAT, deviates from the ecological assumptions of the Plan, it would invalidate provisions

under which the Plan was based. In particular, if western Oregon BLM reserves are withdrawn or degraded by logging this will have far reaching implications to forest management in Washington (where owl populations are in steep decline – e.g., southwest Washington and the Olympic Peninsula), California (where owl populations are connected by BLM reserves distributed across the Coast Range and Klamath physiographic provinces – north-south regional connectivity), the western edge of the Western Cascades (east-west regional connectivity), and for State (e.g., Elliott Forest) and private (e.g., Weyerhaeuser-Millicoma) lands where "take" of threatened species has been authorized by USFWS based on the assumption that federal lands, including BLM reserves, would provide the "backbone" of species recovery across the region.

Judge Dwyer's decision was based on the Plan being legal only if the Forest Service and BLM complied with all aspects of the Plan, including the reserve system. By reducing or eliminating reserves, when in fact the NWFP reserves were already viewed as a "bare minimum," BLM would likely trigger the need to elevate the status of the northern spotted owl (and possibly others – e.g., marbled murrelet, salmon) from threatened to endangered with implications to timber harvest across the region. Clearly, BLM lands in western Oregon are a prime example of where the sum-of-the parts are greater than the whole.

The ISC (Thomas et al. 1990) felt that the safest way to ensure recovery of spotted owls was to protect all old-growth forests and grow more over time, but they designed an approach that accepted some risk and allowed some old forest logging. However, today we know the spotted owl is even more imperiled in parts of its range than previously thought and thus the BLM should design alternatives that preclude old-growth logging while seeking timber volume from small trees in combination with restoration of young stands, roads, streams, and fire dependent ecosystems. Over a decade ago, the ISC recognized that the NWFP would entail the greatest probability of success, and hence embody the lowest degree of uncertainty, if all existing spotted owl habitat were protected and additional acres of young forest were managed to develop into suitable habitat at the soonest possible time (Thomas et al. 1990:11). As it turns out, this was a particularly prudent insurance policy in light of today's continued logging of old-growth forests especially on non-federal lands. To deviate from this wisdom would raise extinction risks to a number of vulnerable species (as demonstrated by USDA Forest Service 1993 and FEMAT

1993) across the range of the northern spotted owl, as the physiographic provinces are interconnected and management in one state or region will have outcomes affecting the larger surroundings.

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Tables

Table 1. Amount of old-growth and mature forest habitat (acres) in BLM LSRs in western Oregon.

BLM District	Old-growth in BLM LSRs	% of BLM old-growth in LSRs	Mature forest in BLM LSRs	% of BLM mature forest in LSRs
Coos Bay	60,362	60%	21,304	32%
Eugene	45,467	71%	12,312	11%
Medford	110,310	24%	42,402	19%
Roseburg	95,147	49%	27,381	50%
Salem	50,620	58%	37,700	24%
Totals	**361,906**	**40%**	**141,099**	**23%**

Table 2. Critical habitat in acres for Northern Spotted Owls (NSO), Marbled Murrelets (MM) and both species in BLM and BLM LSRs in western Oregon.

Species	Critical habitat in western OR	Critical habitat in BLM	% of critical habitat in BLM	Critical habitat in LSRs	% of critical habitat in LSRs
NSO	3,750,292	1,028,691	27%	598,332	16%
MM	1,514,380	485,500	32%	402,095	27%
Both	886,107	378,748	43%	303,231	34%

Table 3. Areas of salmonid evolutionary significant units in western Oregon.

ESU	Acres in BLM	% BLM containing ESU	Acres in BLM LSRs	% of BLM ESU acres in LSRs
Coho	1,822,801	78%	645,461	35%
Chinook	371,424	16%	63,193	17%
Steelhead	218,689	9%	35,173	16%

Table 4. Coho critical habitat types within BLM and BLM LSRs in western Oregon.

Habitat type	Total length (miles)	% of habitat within BLM lands	% of habitat within BLM LSRs	% of BLM habitat in LSRs
Spawning & rearing	6,297	12%	5%	44%
Rearing & migration	2,464	3%	1%	57%
Migration	515	4%	2%	42%

Table 5. Volume estimates for one-time entry within late-successional reserves (LSRs), "Matrix," and Adaptive Management Areas (AMAs) on Bureau of Land Management O&C lands.

NWFP Land Use Allocation	Stand Age	Acres	Acres after a 75% decrease*	MBF estimate per Acre**	Estimate of Potential MBF
LSR	10-30	132,138	33,034	8	264,276
LSR	30-50	113,605	28,401	10	284,012
LSR	50-80	56,090	14,022	12	168,269
Matrix	10-30	194,302	48,575	8	388,604
Matrix	30-50	200,832	50,208	10	502,080
Matrix	50-80	195,686	48,921	12	587,057
AMAs	10-30	14,051	3,513	8	28,102
AMAs	30-50	14,285	3,571	10	35,713
AMAs	50-80	33,806	8,452	12	101,419
Totals		**892,652**	**223,163**		**2,359,531**

* The 75% reduction of potential acres is due to estimates of Riparian Reserves, steep slopes, sensitive areas, and difficulty of access in some areas

** Volume estimates: 10-30 yrs = 8 mbf/ac; 30-50 yrs = 10 mbf/ac; 50-80 yrs = 12 mbf/ac

Appendix A. GIS data sources used in this analysis.

Name	Type	Scale	Date	Source
BLM District boundaries	Polygon	1:100,000	2000	BLM, Oregon State Office
BLM Forest Cover/Operations Inventory	Polygon	1:24,000	2005	OR/WA BLM
Coho critical habitat	Line	1:100,000	2004	Oregon Department of Fish & Wildlife
Elliot State Forest	Polygon	1:12,000	2000	Oregon Department of Forestry
ESUs for coho, chinook, and steelhead	Polygon	1:250,000	2003	National Marine Fisheries Service
Forest cover in the Pacific Northwest	Grid	30m	2004	Conservation Biology Institute
Key watersheds	Polygon	1:100,000	2002	OR/WA BLM & USFS R6
Marbled murrelet critical habitat	Polygon	Unknown	1999	Regional Ecosystem Office
Northern spotted owl critical habitat	Polygon	Unknown	1999	Regional Ecosystem Office
Northwest Forest Plan Land Use Allocations	Polygon	Variable	2002	REO, R6, R5, ORBLM, CABLM
Western Oregon Industrial Forest Land	Polygon	Unknown	1991	OSU, Department of Forest Science

Appendix B. Survey and manage species found within BLM LSRs in western Oregon.

Albatrellus ellisii
Arborimus longicaudus
Arcangeliella camphorata
Bondarzewia mesenterica
Bondarzewia montana
Botrychium minganense
Buxbaumia viridis
Calicium abietinum
Cantharellus subalbidus
Cantharellus tubaeformis
Cetrelia cetrarioides
Chaenotheca chrysocephala
Chaenotheca ferruginea
Chaenothecopsis pusilla
Chalciporus piperatus
Chrysomphalina grossula
Clavariadelphus ligula
Clavariadelphus occidentalis
Clavariadelphus pistillaris
Clavariadelphus subfastigiatus
Clavariadelphus truncatus
Clitocybe senilis
Collema nigrescens
Cortinarius olympianus
Corydalis aquae-gelidae
Craterellus tubaeformis
Cudonia monticola
Cypripedium fasciculatum
Cypripedium montanum
Dendriscocaulon intricatulum
Dermatocarpon luridum
Dermocybe humboldtensis
Diplophyllum plicatum
Fuscopannaria saubinetii
Gastroboletus ruber
Gastroboletus turbinatus
Gomphus clavatus
Gymnopilus punctifolius
Helvella elastica
Hemphillia glandulosa
Hemphillia malonei
Hydropus marginellus
Hypogymnia duplicata
Leptogium cyanescens
Leptogium rivale
Leptogium teretiusculum
Leucogaster citrinus
Lobaria oregana
Mycena overholtsii
Mycena tenax
Nephroma bellum
Nephroma occultum
Otidea leporina
Pannaria saubinetii
Peltigera pacifica
Phaeocollybia attenuata
Phaeocollybia californica
Phaeocollybia dissiliens
Phaeocollybia fallax
Phaeocollybia kauffmanii
Phaeocollybia olivacea
Phaeocollybia oregonensis
Phaeocollybia piceae
Phaeocollybia pseudofestiva
Phaeocollybia scatesiae
Phaeocollybia sipei
Phaeocollybia spadicea
Phlogiotis helvelloides
Pholiota albivelata
Platismatia lacunosa
Prophysaon coeruleum
Pseudocyphellaria perpetua
Pseudocyphellaria rainierensis
Ptilidium californicum
Racomitrium aquaticum
Ramaria amyloidea
Ramaria araiospora
Ramaria aurantiisiccescens
Ramaria celerivirescens
Ramaria cyaneigranosa
Ramaria gelatiniaurantia
Ramaria largentii
Ramaria rubrievanescens
Ramaria rubripermanens
Ramaria stuntzii
Rickenella swartzii
Schistostega pennata
Sparassis crispa
Strix nebulosa
Tetraphis geniculata
Tremiscus helvelloides
Tuber asa
Usnea longissima