Increasing Timber Harvest Levels on the BLM O&C Lands
While Maintaining Environmental Values
Revised
Testimony before the Senate Committee on Energy and Natural Resources

June 25, 2013

Dr. K. Norman Johnson, Department of Forest Ecosystems and Society, Oregon State University

Dr. Jerry F. Franklin, School of Environmental and Forest Science, University of Washington

with the technical assistance of Debora Johnson, Applegate Forestry

I speak today for myself and Dr. Jerry Franklin. These comments represent our own views and not those of our respective institutions.

The BLM in western Oregon administers a collection of land ownerships resulting from various Congressional actions. They include the Oregon and California Railroad Lands, Coos Bay Wagon Roads and Special Act lands, totaling over 2.1 million acres. Collectively, we will call them by their popular name of "BLM O&C lands" (Figure 1). In addition, some O&C lands are within the national forests and are administered by the Forest Service, the "Controverted Lands" (approximately 450,00 acres outside of Wilderness) (Figure 1). We will discuss the Controverted Lands later in this report.

Our testimony today focuses on how we might improve attainment of a key goal of the 1937 O&C Act that set the initial management direction for the BLM O&C lands--attainment of sustained yield of timber harvest that enables a permanent source of timber supply and contribution to the economic stability of local communities.[1] By sustained yield, we mean organization of a property for continuous timber production, under the silvicultural prescriptions, rotation ages, and cutting cycles reflective of the goals for the forest (Helms, 1996).

This specific legislative direction for sustained yield of timber harvest that contributes to the economic stability of local communities makes these federal lands unique, with different responsibilities than our national forests. In addition, the lands are confined within a single state—Oregon--also making them different from other federal lands.

As other acts have been passed, such as the Endangered Species Act and the Clean Water Act, managers of O&C forests have gained added responsibilities that have significantly impacted the sustained yield level of timber harvest (Tuchman and Davis 2013). They are currently managed under the Northwest Forest Plan (USFS and USBLM 1994).

[1] Congress directed that the O&C forests be managed for "…permanent forest production…in conformity with the principle of sustained yield for the purpose of providing a permanent source of timber supply…., protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities."

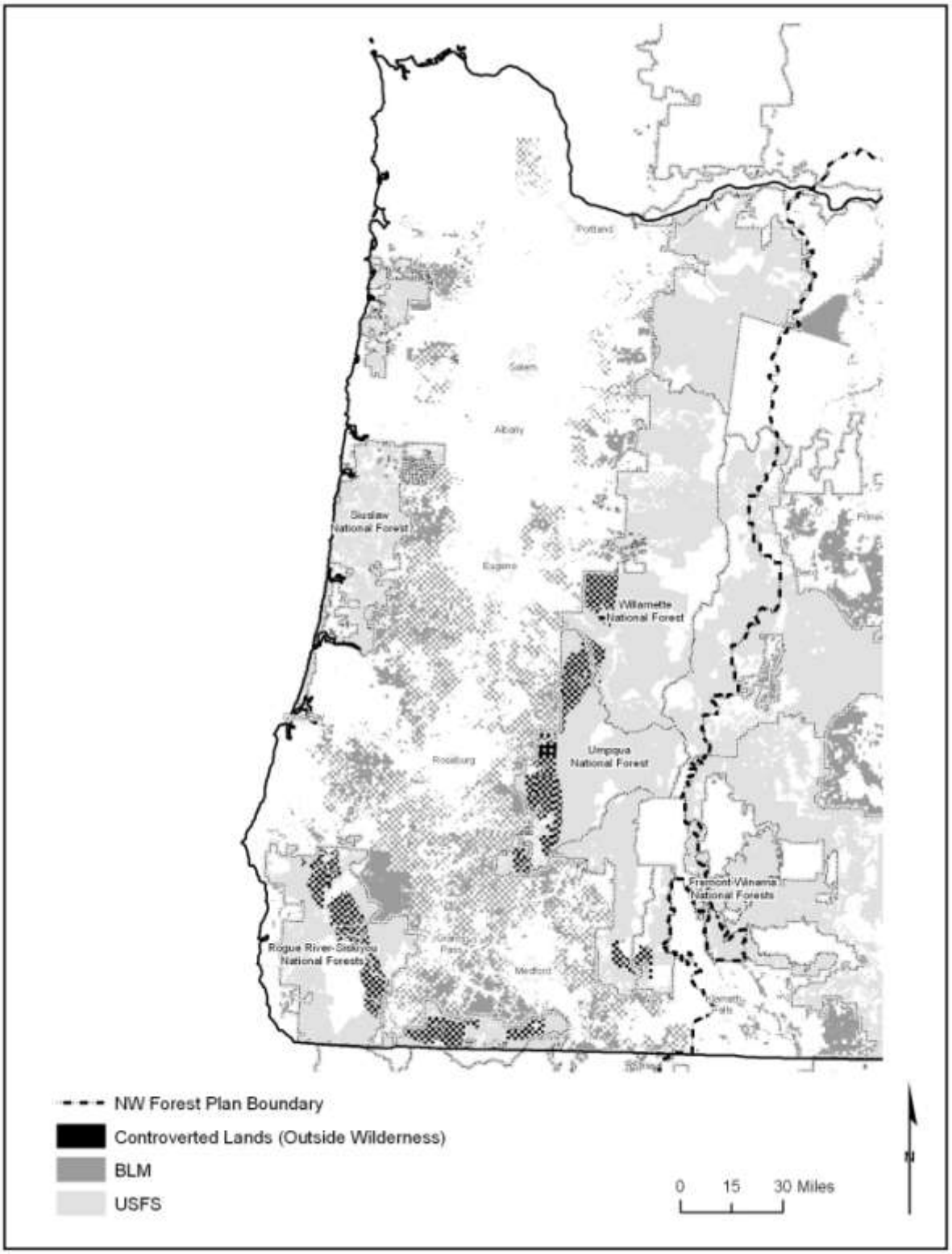

Figure 1. Federal ownership in western Oregon (BLM O&C lands, national forests, and Controverted lands within national forests).

Perhaps the most elusive and frustrating part of managing the BLM O&C lands has been failure to establish a sustained yield of timber harvest that enables a permanent source of timber supply as mandated in the 1937 O&C Act. **The Northwest Forest Plan, under which BLM now operates, designated "Matrix" as the land base for sustained yield management, including regeneration harvest. In the face of public protest and litigation, though, the agency has retreated to a short-term strategy of young stand thinning and fuel reduction, while waiting for a political or administrative decision that will allow it to establish a sustained yield level** and proceed with the harvests to achieve it (Johnson and Franklin 2012, 2013). **The current strategy has a limited time-frame (perhaps 15 years) until it will exhaust harvest opportunities; also, it produces only very modest payments to the counties in which these forests lie.**

We base on our recommendations on the experience of the last three years in which we assisted the BLM in setting up a number of demonstration projects to help them move beyond the current strategy to one that will be more long lasting. **Our experience suggests that timber harvests will be difficult to implement unless there are evident ecological and social benefits--the broad support gained for both plantation thinning and fuel reduction illustrate this concept and why BLM has limited its recent harvest activities to those treatments.**

Also, a recent survey of Oregonians showed that they favor ecological forestry approaches to the BLM O&C lands over more traditional intensive management approaches even though they would produce lower harvest and revenue. These results also hold in the downstate counties most impacted by the reduction in O&C harvest (Taylor 2013).

With these observations in mind, we suggest an "Ecological Forestry" approach to management of the BLM O&C lands--one that will provide both ecological and economic benefits now and into the future.

"Ecological Forestry" incorporates principles of natural forest development, including the role of natural disturbances, in the initiation, development, and maintenance of stands and landscape mosaics (Seymour and Hunter 1999, Franklin et al. 2007, Franklin and Johnson 2012). Ecological Forestry is based, therefore, on application of our best current ecological understanding of forest ecosystems in managing these ecosystems to achieve integrated environmental, economic, and cultural outcomes.

We wish today to describe Ecological Forestry concepts and how they can assist in providing a sustained yield of timber harvest from the BLM O&C lands.

Recognition of Moist Forests and Dry Forests

For management and discussion, we divide the BLM O&C forests into Moist Forests and Dry Forests, because of their contrasting disturbance regimes and responses to management, and the fundamental need for differing policies with regard to protection of old-growth forests and trees (Franklin and Johnson 2012) (Figure 2).

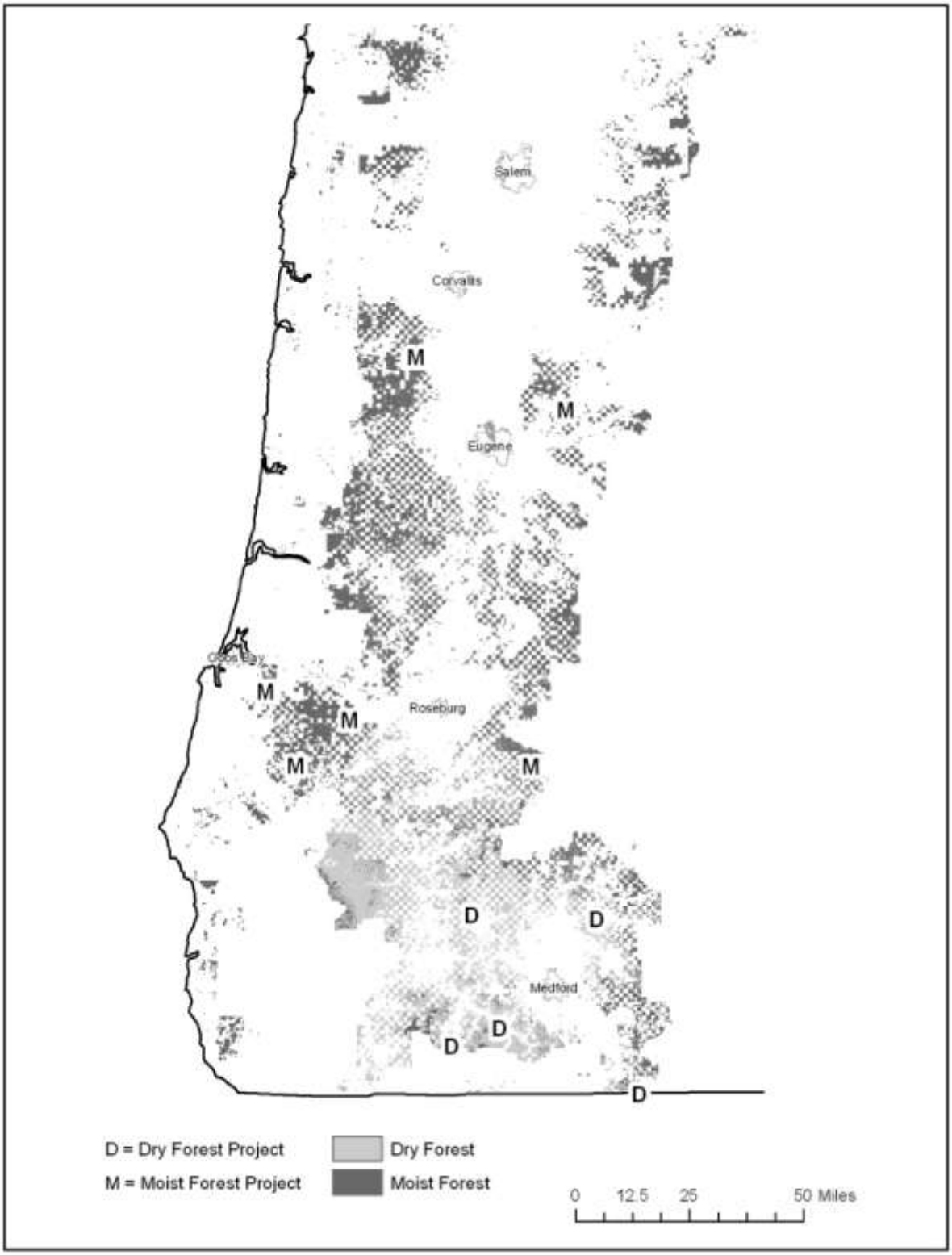

Figure 2. Moist Forests and Dry Forests of BLM O&C lands showing the location of Ecological Forestry Projects (M or D).

Over the last two years, we have worked with the Department of Interior and Oregon BLM to design and implement Ecological Forestry projects in Moist Forests and Dry Forests on the BLM O&C lands--projects that have both ecological and economic benefits (Johnson and Franklin 2012, 2013) (Figure 2).

We will discuss below the potential of both types of forest (Moist and Dry) to contribute to a permanent timber supply. Much of our discussion centers on Moist Forests as they hold most of the timber volume, growth, and economic value of these lands.

Ecological Forestry in Moist Forests

Moist Forest ecosystems undergo many centuries of stand development and change following major disturbances, such as severe wildfire or windstorm, before achieving the massiveness and structural complexity of old-growth forests (Franklin et al. 2002). Composition, structure, and function of existing unmanaged old-growth Moist Forests generally are relatively unaffected by human activities, except at stand edges (Forest Ecosystem Management Assessment Team 1993). Management activities in these existing old-growth Moist Forests, such as thinning, are not needed to sustain desired conditions in these forests and can actually cause old-growth Moist Forests to diverge widely from natural forests in structure and function or become destabilized (Franklin et al. 2002). Wildfire suppression is typically consistent with efforts to retain such forests--i.e., it is not known to result in significant changes in Moist Forest ecosystems (Agee 1993).

Restoration may be needed in Moist Forest landscapes in which old-growth stands are embedded, however. Many Moist Forest landscapes are currently dominated by dense young plantations, which are low in biodiversity and deficient in the early (pre-forest) and late (mature and old-growth) successional stages, which are richest in biodiversity (Wimberly 2002, Spies et al. 2007). Late-successional Moist Forests provide habitat for thousands of species including the Northern Spotted Owl (NSO) (*Strix occidentalis caurina*) and other habitat specialists (Forest Ecosystem Management Assessment Team 1993); past timber harvests have greatly reduced their extent and continuity (Forest Ecosystem Management Assessment Team 1993, Wimberly 2002, Spies et al. 2007). Continued decline in NSO populations across much of its range have heightened the importance of retaining late successional forests (Forsman et al. 2011).

Early successional or seral Moist Forest sites are highly diverse, trophic- and function-rich ecosystems that develop after a severe disturbance but before the re-establishment of a closed forest canopy (Swanson et al. 2011). Conceptually, disturbances of either natural (e.g. wildfire) or human (e.g. timber harvest) origin are capable of generating this stage.

Large natural disturbances often produce high-quality early seral ecosystems provided they are not intensively salvaged and replanted (Swanson et al. 2011). However, such disturbances are unevenly distributed in time and space.

Areas devoted to traditional intensive timber production (clearcut, site preparation, dense planting and control of competing vegetation to ensure rapid dominance of the next forest crop on the site) provide little high quality early seral habitat for several reasons. First, few or no structures from pre-harvest stands (e.g., live trees, snags, and logs) are retained on intensively

managed sites, although they are abundant following severe natural disturbances (Swanson et al. 2011). Additionally, intensive site preparation and reforestation efforts limit both the diversity and duration of early seral organisms, which are often actively eliminated by use of herbicides or other treatments (Swanson et al. 2011). Consequently, many Moist Forest landscapes currently lack sufficient representation of high-quality early seral ecosystems due to harvest, reforestation, and fire suppression policies on both private and public lands (Swanson et al. 2011, Spies et al. 2007).

Functional early seral habitat potentially can be created using regeneration harvest prescriptions that retain biological legacies and use less intensive approaches to re-establishment of closed forest canopies (Franklin and Johnson 2012). Such approaches would produce more modest timber yields than the intensive management described above but could provide significant ecological benefits.

Given all these considerations, and others, we utilize the following Ecological Forestry strategy for Moist Forests on BLM O&C lands (Franklin and Johnson 2012):

- Retain existing older stands and individual older trees found within younger stands proposed for management, using a selected threshold age;
- Accelerate development of structural complexity in younger stands, using diverse silvicultural approaches;
- Implement variable retention regeneration harvests in younger stands (stands generally less than 80 years of age), retaining such structures as individual trees, snags, and down logs and intact forest patches;
- Accommodate development of diverse early seral ecosystems following harvest, by using less intense approaches to site preparation and tree regeneration;
- Embed the preceding objectives in a silvicultural system that includes creation and management of multi-aged, mixed-species stands on long rotations (e.g., 100-160 years); and,
- Develop landscape-level plans for distributing variable retention regeneration harvests to assure desired placement and appropriate scale of implementation.

Sources of a Permanent Timber Supply from BLM Moist Forests

Under the Northwest Forest Plan, the "Matrix" is the source of long-term timber supply--the part of the BLM O&C lands that has long-term timber production as a goal. Over the last 20 years, the effective Moist Forest Matrix acreage available for sustained yield management has been significantly reduced from that originally identified in the Northwest Forest Plan (Figure 3). Four major reasons for this shrinkage are: 1) Critical Habitat for the NSO covering Matrix (USFWS 2012), 2) Recommended Actions in the NSO Revised Recovery Plan that result in protection of older stands in the Matrix (USFWS 2011), 3) Habitat for the Marbled Murrelet discovered over time in Matrix, and 4) Buffer requirements for Survey and Manage Species. It must be added that public protest of harvest of mature and old forest in the Matrix often predated these administrative actions and effects, contributing in many ways to the shrinkage in this land base. **We estimate that, at most, 10% of Moist Forest acreage--the "available" Matrix--can currently be included, with some certainty, in the land base for sustained yield management.**

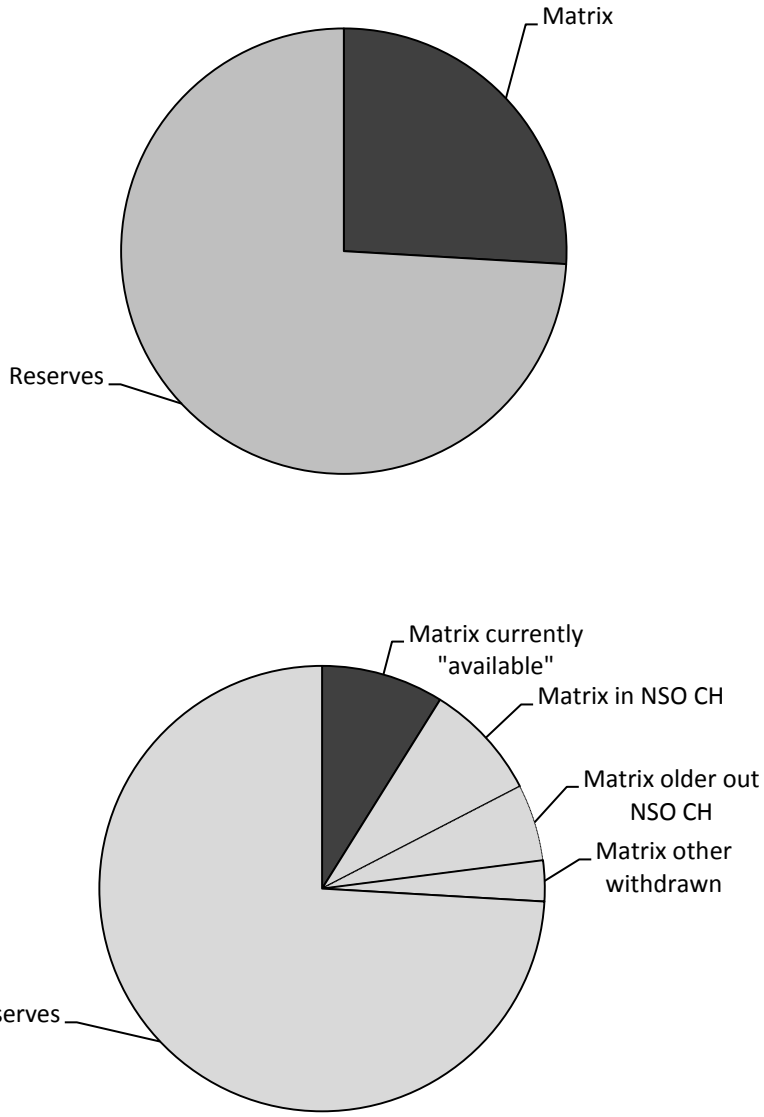

Figure 3. Division of acres between Matrix and Reserves in BLM Moist Forests: Original division in Northwest Forest Plan (above) and current division (below). Matrix is the allocation in the Northwest Forest Plan designated for sustained yield harvest to achieve a permanent timber supply. NSO CH = Northern Spotted Owl Critical Habitat. Reserves in Moist Forests (Late Successional Reserves, Riparian Reserves, and Other Reserves) are not available for sustained yield management. Thinning can occur in Late Successional Reserves and Riparian Reserves in stands less than 80 years of age to achieve ecological goals but regeneration harvest—an essential component of long-term timber supply in Moist Forests--cannot occur.

We have concluded that reversing these trends, and providing a robust long-term timber supply from the O&C Moist Forests will require: 1) utilizing management strategies that provide both ecological and economic benefits and 2) expanding the land base for long-term timber production in ways that sustain environmental values. We will discuss each in turn.

Moist Forest Management Strategies That Provide both Ecological and Economic Benefits

As mentioned above, our experience indicates that Moist Forest regeneration harvests---an essential component of sustained yield management---will be difficult to implement unless there are evident ecological benefits. BLM has limited its recent activities in Moist Forests to plantation thinning where such benefits can be demonstrated.

To restart regeneration harvests, we recommend a silvicultural strategy that utilizes variable retention harvest followed by the nurturing of diverse early seral ecosystems and the growing of forests stands on rotations long enough for bio-complexity to appear-- an approach that sustains important elements of biodiversity and creates desired ecosystem structures and processes while providing timber harvest and revenue. While this strategy would not provide per acre harvest levels equivalent to those attained under intensive management, such an approach would provide a permanent timber supply.

We are currently working with four BLM Districts to demonstrate this approach on the O&C lands (Figures 4 and 5).

Figure 4. The Buck Rising project in the Roseburg District illustrating variable retention harvest. Approximately 40% of the stand was retained in patches and individual trees.

Figure 5. An example of the post-harvest diverse early seral community on the Roseburg BLM District that is a goal of Ecological Forestry in Moist Forests. Shrub species include snowbrush, manzanita, bitter cherry, trailing blackberry, and elderberry as well as a variety of herbaceous plants. Douglas-fir saplings are beginning to emerge from the shrub communities.

These Moist Forest Ecological Forestry Projects have been misrepresented in some quarters: 1) they do not involve the harvest of old growth trees and 2) they do not utilize clearcutting. Rather they use variable retention harvest, which has different ecological effects than clearcutting (Lindenmayer et al. 2012, Gustafsson et al. 2012). We find it difficult to understand how such harvests can be described as clearcutting when 30% or more of the pre-harvest forest on the harvest units is retained for the next rotation!

Expanding the Moist Forest Land Base for Sustained Yield Management While Maintaining Environmental Values

To help in the discussion of land base for sustained yield management, we organized the BLM O&C forests by their major land allocations under the NWFP, their age class, and whether they lie within recently designated Critical Habitat for the Northern Spotted Owl (Johnson and Franklin (2013).

Given the goals of the Northwest Forest Plan and recovery plans for threatened and endangered species, the younger forest outside of NSO Critical Habitat (less than 80 years of age) is the likely current source of acres for sustained yield management (see Johnson and Franklin 2013 for more discussion). The acres are shown in the far left bar of Figure 6. Also, some of the more simplified stands in the 80-120 class might be available.

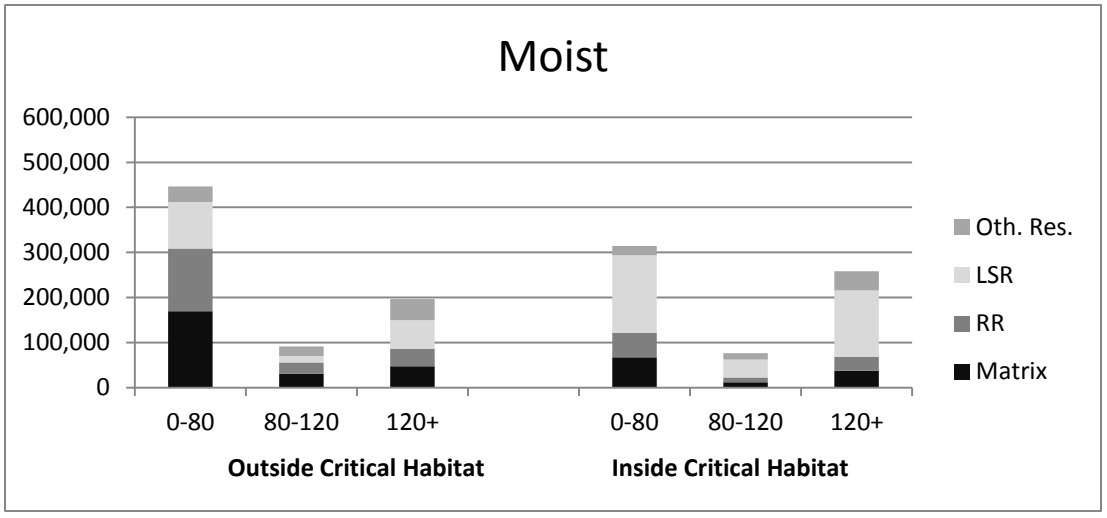

Figure 6. Acres of BLM's O&C Moist Forests (top) inside and outside of Critical Habitat for the Northern Spotted Owl (USFWS 2012), by land allocation under the Northwest Forest Plan and by age class. Matrix = lands originally intended to have sustained yield management as one of their goals. RR = Riparian Reserves. LSR = Late Successional Reserves. Thinning is allowed in both RR and LSR to achieve their ecological objectives. Oth. Res. = Other Reserves. Other Reserves include Congressional and Administrative withdrawals and forest too steep, unstable, or unproductive to be considered for timber production. Contributed by Debora Johnson.

We suggest three potential changes that would increase the Moist Forest land base for sustained yield on the BLM O&C lands while still meeting the goals of the Northwest Forest Plan and recovery plan goals:

1) **Apply one of the alternative stream buffering strategies of Reeves et al. (2013) to modify Riparian Reserves within the Matrix;**
2) **Re-evaluate the need for younger stands, outside of the Critical Habitat designation for the NSO, to remain in Late Successional Reserves;**
3) **Limit Survey and Manage Requirements to species known to be in decline or some difficulty;**

Each of these changes is described below. It should be noted that these changes may come with special provisions to address remaining concerns about effects on species and ecosystems.

In addition, we recommend that the BLM accelerate its collaborative effort with the US Fish and Wildlife Service to understand the potential role of Moist Forest variable retention harvest in Critical Habitat for the Northern Spotted Owl and identify the potential level of activity over the next five to ten years.

Finally, we recommend considering these ideas for the Controverted Lands now managed by the USDA Forest Service along with the application of Ecological Forestry to those lands.

Reshape Riparian Buffers

Use scientifically credible methodologies to modify the Riparian Reserves of the Northwest Forest Plan, while still achieving the aquatic ecosystem goals of the Aquatic Conservation Strategy (ACS) (Reeves et al. 2013) and other ecological goals provided by those forests.

Interim buffers (aka Riparian Reserves) of two-site potential tree heights on fish-bearing streams and one-site potential tree height on non-fish bearing streams occupy at least 40% percent of Moist Forest Matrix under the (Northwest Forest Plan (NWFP). These interim buffers were identified as part of the NWFP in 1994, with the expectation that subsequently they would be revised as the NWFP was implemented. With rare exception, the interim buffers have not been revised (Thomas et al. 2007, Reeves et al. 2006, Reeves et al. 2013).

Recently developed science and analysis tools (Benda et al. 2007) have opened the way to possible refinement of those buffer sizes. Applying these tools and science to streams in BLM Matrix, Reeves et al. (2013) concluded that alternatives exist to the current implementation of the ACS that reshape and reduce the buffer area needed to meet the goals of the ACS. One alternative has fixed widths and one has variable widths based on stream segment features. Both alternatives utilize "tree tipping" to ensure that thinning within buffers does not negatively affect wood delivery to the stream.[2] Also, both alternatives limit harvest to younger stands (stands generally less than 80 years of age).

Alternative A applies fixed-width buffers of one site-potential tree height for both fish-bearing and non-fish bearing streams.

[2] See Reeves, et al. (2013) for detail on the analysis and alternatives beyond that covered here.

- The buffer on fish-bearing streams and the inner half of non-fish-bearing streams would continue to be devoted solely to ecological goals as defined in the Aquatic Conservation Strategy.
- Ecological Forestry (with tree tipping) could be applied in younger stands in the outer half of the non-fish bearing streams to achieve ecological goals and sustained yield goals.

The second tree height on fish-bearing streams would no longer be included in the riparian buffer. Thus, that area would be available for the application of Ecological Forestry to younger stands. Use of Ecological Forestry would enable that portion of the forest to continue providing a variety of functions for the many terrestrial species that use areas near streams while also providing sustained timber harvest.

Under Alternative A, Riparian Reserve acreage in Matrix under current implementation of the ACS in the Northwest Forest Plan, would be allocated as follows: half would continue to be solely devoted to ecological goals and half would be devoted to both ecological and sustained yield goals, with harvest limited to younger stands.

Alternative B also applies fixed-width buffers of one site-potential tree height for both fish-bearing and non-fish bearing streams, but divides the area within the site-potential tree height between different goals for each stream segment based on its contribution to aquatic ecosystem values and then places each segment into one of two categories: 1) more ecologically sensitive and productive and 2) less ecologically sensitive and productive.

- The buffer on the more ecologically sensitive and productive stream segments would continue to be devoted solely to ecological goals as defined in the Aquatic Conservation Strategy, as would the buffer on the first 100’ on less ecologically sensitive and productive fish-bearing stream segments and the first 50’ of less ecologically sensitive and productive non-fish bearing stream segments.
- Ecological Forestry (with tree tipping) could be applied to younger stands in the outer portions of the less ecologically sensitive and productive stream segments to achieve ecological goals and sustained yield goals.

As with Alternative A, the second tree height on fish-bearing streams would no longer be included in the riparian buffer. Thus, that area would be available for the application of Ecological Forestry to younger stands. Use of Ecological Forestry there would enable that portion of the forest to continue providing a variety of functions for the many terrestrial species that use areas near streams while also providing sustained timber harvest.

Under Alternative B, Riparian Reserve acreage in Matrix under current implementation of the ACS in the Northwest Forest Plan would be allocated as follows: approximately two-fifths would continue to be solely devoted to ecological goals and approximately three-fifths would be devoted to both ecological and sustained yield goals, with harvest limited to younger stands. The exact distribution between the two categories varies by watershed.

The modeling in Alternative B takes a landscape approach that makes it possible to understand the location of the most ecologically important stream segments across multi-owner watersheds. The Reeves, et al. work (2013) showed that many of the most important segments are on private lands that have much less extensive stream buffer requirements than federal lands, especially on

small non-fish streams. This capability should enable the targeting of aquatic conservation and recovery across ownerships--a truly "all lands" approach.

Implementation of this revised buffer strategy should also include an examination of road systems near streams and removal/decommissioning of problem roads. Without such an effort, it will be difficult to achieve the goals of the ACS.

Shift Portions of Late Successional Reserves to Sustained Yield Management

Shift younger stands in LSRs outside Critical Habitat to Matrix--i.e., aligning LSRs and NSO Critical Habitat. A major purpose of LSRs was to provide reserves of sufficient size to maintain self-sustaining populations of NSOs. They were drawn using the best available information 20 years ago, but new knowledge and more advanced techniques have made an improved placement possible. While there were other justifications for LSRs, especially within the range of the Marbled Murrelet (near the Coast), conservation of the NSO was the major justification for the size and placement of the LSRs.

Thus, Critical Habitat is somewhat "out of sync" with the original landscape allocations of the Northwest Forest Plan; redesign of the LSRs to better align them with NSO Critical Habitat would increase the area available for sustained yield management using Ecological Forestry.

This reallocation should focus on shifting younger stands and stands in the LSRs. Provisions of the Revised Recovery Plan (Recovery Action 10 and Recovery Action 32) call for protection of historical owl activity areas and protection of older, more complex portions of forests in Matrix outside of Critical Habitat.

Substitute a Sensitive Species Policy for the Survey and Manage Policy

Focus species-specific management on species of concern. The Survey-and-Manage (S&M) element of the Northwest Forest Plan (NWFP) represented an unparalleled attempt to protect rare, little-known species associated with late-successional and old-growth forests on more than 25 million acres of federal lands (Molina et al. 2006). The FEMAT mission included "...maintenance or restoration of habitat conditions to support viable populations, well distributed across their current ranges, of species known (or reasonably suspected) to be associated with old-growth forest conditions." Therefore, the persistence of 1,120 individual species and species groups associated with late successional and old-growth (LSOG) forest were evaluated relative to achieving the viability objective in FEMAT and the subsequent environmental impact statement (Molina, et al. 2006).

The FEMAT analysis concluded that insufficient knowledge was available to determine whether the NWFP's system of reserves would be adequate for 427 species--some LSOG forest was still available for harvest in the Matrix. The S&M list included amphibians, bryophytes, fungi, lichens, mollusks, vascular plants, functional groups of arthropods, and one mammal--the Red Tree Vole (Molina et al. 2006). To remedy this deficiency S&M provisions were added for these species, which typically required surveys to determine whether they were present on sites proposed for activities, such as timber sales, and mitigation measures, such as protective buffers, when they were found.

We suggest substitution of a "Sensitive Species Policy" for "Survey and Manage" as a way to focus analysis on those LSOG species that are of concern. We suggest this approach for two reasons: 1) Continued harvest of LSOG forest in the Northwest Forest Plan caused the need for S&M. Yet, that harvest, by and large, did not happen and will not happen under the NSO Revised Recovery Plan and NSO Critical Habitat. Therefore the need for such an approach has greatly diminished. 2) The species-specific approach taken in the NWFP, in attempting to maintain or restore habitat conditions for viable populations for all species associated with LSOG forests, followed the "viability rule" in the regulations implementing the National Forest Management Act. That regulation has been revised to focus on species about which there is "conservation concern." We will discuss this second point below.

The viability objective quoted above and utilized in the NWFP originated from regulations associated with implementing the National Forest Management Act (USDA 1982) and was specifically limited to vertebrates in that regulation. However, in FEMAT, it was applied to invertebrates as well as vertebrates and to BLM lands as well as National Forest lands, an interpretation ruled by courts to be within the discretion of the Secretaries of Agriculture and Interior to adopt and implement (Seattle Audubon Soc'y v. Lyons 1994).

Species were put in the S&M category because there was insufficient knowledge about how the NWFP might influence their habitat and population dynamics. Thus, the burden of proof was on the land manager to show that these species would not be harmed by a proposed activity. Given an ecosystem management plan in place, like the Northwest Forest Plan complemented by the NSO Revised Recovery Plan and Critical Habitat, an alternative approach would be to require evidence that population levels and trends for the species indicated concerns and, if concerns were established, to apply special protocols. This approach would be similar to that taken in the recently revised regulation regarding implementation of the National Forest Management Act (USDA 2012) in which consideration of individual species is limited to those for which the responsible official has determined that a proposed ecosystem management plan would not be sufficient.[3] A comparable approach here would use the ecosystem plan in place (like the NWFP supplemented by Critical Habitat) to conserve species, except where evidence exists that additional measures are required.

In Moist Forests, this change could increase the availability of younger stands. Mature and old growth stands would not be affected since they are already committed to recovery of Threatened and Endangered Species, as discussed earlier, and other goals.

[3] "The responsible official shall determine whether or not the plan components required by paragraph (a) of this section provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area. If the responsible official determines that the plan components required in paragraph (a) are insufficient to provide such ecological conditions, then additional, species-specific plan components, including standards or guidelines, must be included in the plan to provide such ecological conditions in the plan area USDA 2012, 219.9 (b)". Paragraph (a) states: "the plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore their structure, function, composition, and connectivity (USDA 2012 219.9(a).)"

The recent analysis of the status of the Red Tree Vole by USFWS (USDI 2011) may offer an opportunity as described above. The Department of Interior decided that "After review of the best available scientific and commercial information, we have determined that listing the North Oregon Coast population of the Red Tree Vole as a DPS (distinct population segment) is warranted. However, the development of a proposed listing rule is precluded by higher priority actions… Upon publication of this 12-month petition finding, we will add this DPS of the Red Tree Vole to our candidate species list (USDI 2011, p. 63720)." This DPS covers the Oregon Coast Range north of the Siuslaw River. Thus, Survey and Manage considerations relative to the Red Tree Vole might be limited to the stands north of the Siuslaw River. Such a change could reduce the need for special Red Tree Vole buffers in a stand like the one in the Coos Bay Pilot (a "younger stand" as described above)--requirements that helped push retention amounts in a variable retention regeneration harvest to higher levels than would otherwise have been needed. In addition, this change could significantly reduce the cost of timber sales by eliminating expensive surveys of proposed projects.

Assess Potential Harvest Activities on Moist Forest within NSO Critical Habitat

Both the NSO Revised Recovery Plan (USFWS 2011) and Critical Habitat rule (USFWS 2012) emphasize the potential application of Ecological Forestry within Critical Habitat (USFWS 2012 p. 30):

> "In sum, vegetation and fuels management in dry and mixed-dry forests may be appropriate both within and outside designated critical habitat where the goal of such treatment is to conserve natural ecological processes or restore them (including fire) where they have been modified or suppressed*… Likewise, in some moist and mixed forests, management of northern spotted owl critical habitat should be compatible with broader ecological goals, such as the retention of high-quality older forest, the continued treatment of young or homogenous forest plantations to enhance structural diversity, heterogeneity and late-successional forest conditions, and the conservation or restoration of complex early-seral forest habitat, where appropriate… (italics added)*
>
> In general, actions that promote ecological restoration and those that apply ecological forestry principles at appropriate scales as described above and in the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-11 to III-41) may be, in the right circumstances, consistent with the conservation of the northern spotted owl and the management of its critical habitat."

Currently, the form and extent of such active management is too problematic for forests within NSO Critical Habitat to be part of the Most Forest land base for sustained yield management. Discussion and demonstration will be necessary to clarify the type, amount, and landscape pattern of timber harvest that is acceptable in Critical Habitat. That activity has already begun in the Roseburg and Eugene Districts and elsewhere, where variable retention harvest projects have been developed, and are being developed, within Critical Habitat. Shifting from individual project development to landscape assessment of the magnitude and pattern of variable retention harvest over time will be a key to determining the contribution Critical Habitat to sustained yield. This will require a major collaborative effort by BLM and USFWS. Perhaps, a five or ten year commitment of project acreage for harvest activities could be the outcome of such an effort.

Apply These Ideas to the O&C Controverted Lands Managed by the Forest Service

Some Oregon & California Railroad lands are administered by the Forest Service, referred to as the Controverted Lands (Figure 1). These Controverted Lands reside within the boundaries of the national forests and cover lands equal to approximately 20 percent of BLM O&C lands. Some are in Wilderness or other Congressional and Administrative withdrawals, but many could be considered for sustained yield management. We classify approximately two- thirds of these lands as Moist Forest and one-third as Dry Forest. The younger Moist Forests on Controverted Lands, especially in the Cascades, provide useful locations to demonstrate Ecological Forestry on the national forests and also to apply the ideas mentioned above for expanding the land base for sustained yield management.

Ecological Forestry in Dry Forests

Composition and structure of existing Dry Forests landscapes have been dramatically altered by decades of fire suppression, grazing by domestic livestock, timber harvesting, and plantation establishment (Noss et al. 2006) resulting in: (1) fewer old trees of fire-resistant species, (2) denser forests with multiple canopy layers, (3) more densely forested landscapes with continuous high fuel levels, and, consequently, (4) more stands and landscapes highly susceptible to stand-replacement wildfire and insect epidemics (e.g., Hessburg et al. 2005, Noss et al. 2006, Johnson and Franklin 2012).

In southwest Oregon, Dry Forest sites that have not been previously harvested are largely occupied by dense maturing Douglas-fir stands, which often appear to be the first generation of closed-conifer forests on these sites. Scattered old pines and hardwoods are being crowded out by these younger Douglas-fir trees. Historically, many of these Dry Forest landscapes were occupied by more diverse communities including open grasslands, shrub fields, oak savannas, and mixed hardwood and conifer woodlands (McKinley and Frank 1996).

Given these considerations, we suggest the following Ecological Forestry strategy for Dry Forests on the BLM O&C lands (Franklin and Johnson 2012):

- Retain and improve survivability of older conifers by reducing adjacent fuels and competing vegetation;
- Retain and protect other important structures such as large hardwoods, snags, and logs; some protective cover may be needed for cavity-bearing structures that are currently being used;
- Reduce overall stand densities by thinning so as to (1) reduce basal areas to desired levels, (2) increase mean stand diameter, (3) shift composition toward fire- and drought-tolerant species, and (4) provide candidates for replacement of old trees;
- Restore spatial heterogeneity by varying the treatment of the stand, such as by leaving untreated patches, creating openings, and providing for widely spaced single trees and tree clumps;
- Establish new tree cohorts of shade-intolerant species in openings;
- Treat activity fuels and begin restoring historic levels of ground fuels and understory vegetation using prescribed fire; and,

- Plan and implement activities at landscape levels, incorporating spatial heterogeneity (e.g., provision for denser forest patches, such as those needed by the NSO and its prey species) and restoration needs in non-forest ecosystems (e.g., meadows and riparian habitats).

The Dry Forests on BLM western Oregon Forests are immensely important to the people of southwest Oregon in many ways and numerous ecological and social tensions surround their conservation and use. Increasing stand densities threaten both neighboring homes and communities and the forests themselves (Johnson and Franklin 2012). Yet, harvests under restoration strategies often do not yield substantial revenue, making it difficult to pay for actions that address public concerns and increase forest sustainability. Also, some challenge the need for action. Thus, application of Ecological Forestry to the federal Dry Forests of southwest Oregon remains extremely challenging.

Retaining and nurturing older trees and other significant structural elements of the Dry Forest stand is the starting point in the application of Ecological Forestry to Dry Forests. **That will require active management.** Although many Dry Forests include older trees, almost all such forests are highly modified structurally and compositionally by past management, which has greatly reduced older tree populations and resulted in increased stand densities. Both remaining old trees and the forest in which they are embedded are currently at risk from intense wildfires, epidemics of defoliating insects, and competition, the latter resulting in accelerated mortality due to bark beetles. Selection of a threshold age for older trees is particularly important for Dry Forests, since it is applied to all Dry Forest stands. In our work we usually use 150 years as the threshold age for older trees because: (1) trees in Dry Forests generally begin exhibiting some old-growth characteristics by this age, and (2) significant Euro-American influences that disrupted historical disturbance regimes were underway by 1860, e.g., introduction of large domestic livestock herds and mining.

Retaining some denser forest areas in an untreated or lightly treated condition is an important landscape-level planning component of our Dry Forest restoration strategy. Most Dry Forest landscapes include species and processes that require denser forest as habitat, such as preferred nesting, roosting, and foraging habitat for the NSO and its prey species (USFWS 2011). Maintaining approximately one-third of a Dry Forest landscape in denser patches of multi-layered forest has been proposed for the NSO (Courtney et al. 2008) and the need for a mosaic of denser patches and treated areas is acknowledged in the NSO recovery plan (USFWS 2011). In general, landscape amounts and distributions will be a function of topographic and vegetative factors along with wildlife goals. Untreated patches in the hundreds of acres could be preferentially located in less fire-prone areas, such as steep north-facing slopes, riparian habitats, and sites protected by natural barriers, like lakes and lava flows. The longevity of the dense forest patches should be increased by reducing stand densities in the surrounding landscape matrix (Ager et al. 2007, Gains et al. 2010). Losses of denser forest patches are inevitable, but--since the surrounding restored matrix would still be populated with older, larger trees under this Ecological Forestry approach-suitable dense replacement habitat can be regrown. The Pilot Joe and Pilot Thompson projects in the Applegate Watershed illustrate these Dry Forest principles (Figures 7 and 8). Dense patches that will be retained in this project, called Late Successional Emphasis Areas (LSEAs). Commercial and non-commercial treatments were then

planned around them to increase the sustainability of the treated areas and reduce the potential for the dense patches to be caught by a running crown fire from the valley below.

Figure 7. Views of the partial cut in Pilot Joe--a Dry Forest Ecological Forestry Project. About half of the stems were removed.

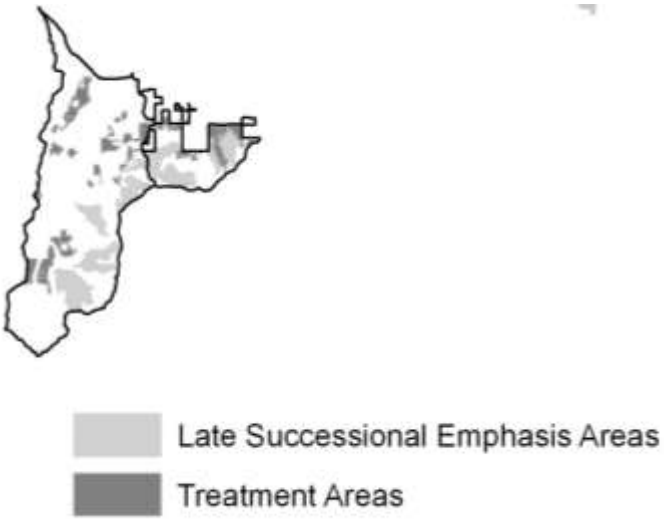

Figure 8. Landscape design of the Pilot Joe and Pilot Thompson Projects.

Some key points about our Dry Forest landscape strategy are:

1) LSEAs are not reserves. Rather they are part of a dynamic landscape; over time some of these dense forest patches are expected to be lost to wildfires and new ones will have to be created by allowing restored forest areas to grow into a denser forest state.
2) Management is not prohibited. While we did not suggest entry into LSEAs in Pilot Joe, limited activities can be considered to reduce fuels and to achieve other goals as long as a forest structure is retained that will meet the needs for the species of interest. Cooperative efforts by BLM and USFWS to determine needs and actions would be desirable.
3) **This strategy is intended for the entire landscape—Matrix and LSRs and both inside NSO Critical Habitat and outside NSO Critical Habitat.**

Given this strategy for Dry Forests, distinguishing stands by age, land allocation, and location relative to Critical Habitat for the NSO (Figure 9) is much less useful than in Moist Forests in determining where and how Ecological Forestry might be applied. As described above, this strategy is intended to be applied across land allocations, Critical Habitat determinations, and age classes.

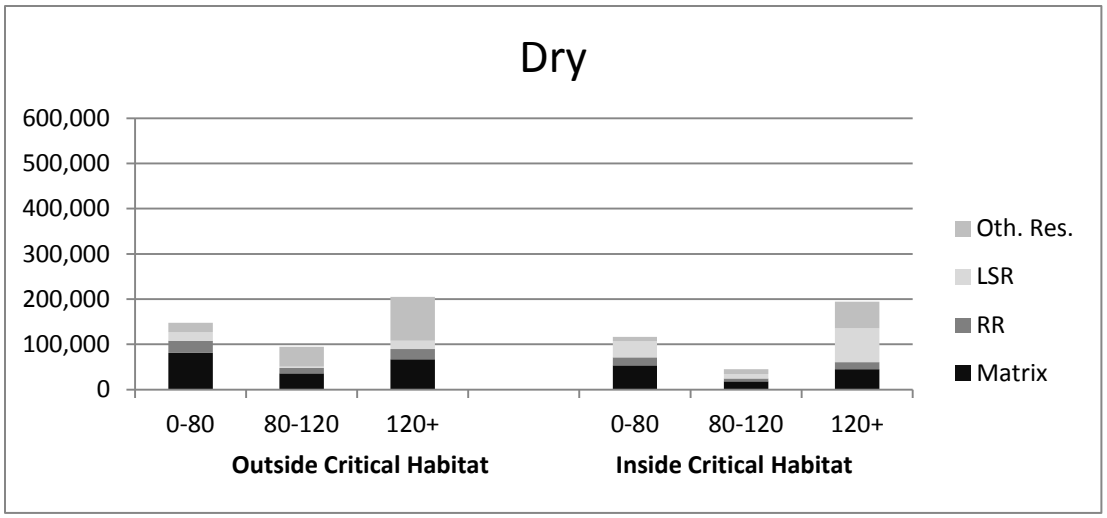

Figure 9. Acres of BLM's O&C Dry Forests inside and outside of Critical Habitat for the Northern Spotted Owl (USFWS 2012), by land allocation under the Northwest Forest Plan and by age class. Matrix = lands originally intended to have sustained yield management as one of their goals. RR = Riparian Reserves. LSR = Late Successional Reserves. Thinning is allowed in both RR and LSR to achieve their ecological objectives. Oth. Res. = Other Reserves. Other Reserves include Congressional and Administrative withdrawals and forest too steep, unstable, or unproductive to be considered for timber production. Contributed by Debora Johnson,

In summary, we suggest a number of principles to guide application of Ecological Forestry in Dry Forests:

- **Don't put "old" stands off limits to active management, including removal of trees—they will need action to save the old trees within them.** These stands often require harvest of younger trees around old trees to reduce ladder fuels and competition and improve their longevity. Stand age thresholds to limit actions, such as those suggested previously for Moist Forests, ***are not appropriate*** in Dry Forests if the intent is to sustain these forests and the older trees that they contain.

- **Don't allow Survey and Manage restrictions to prevent actions that will reduce stresses on old trees--consider a Sensitive Species policy as described above** or prevent treatments to reduce stand densities and increase heterogeneity outside of the denser patches. A strategy for Survey and Manage species in Dry Forests, similar to that which we discussed for Moist Forests above, might be considered--focus on individual species where a concern has been demonstrated.

- **Don't create large reserves in which harvest is prohibited, since that will increase the probability that the forests within them will not survive.** The LSR network of the NWFP originated as part of a Moist Forest conservation strategy that called for large, contiguous areas of reserves where late-successional forests would develop and where natural processes would be allowed to function. This approach was carried over to Dry Forests where it was not appropriate, which is why the NWFP actually allowed for active restoration treatments in LSRs in Dry Forest landscapes. It is important that the reserve strategy of the NWFP be allowed to evolve into a network of modest-sized dense forest patches across the Dry Forest landscape.

- **Do develop a landscape plan across the Dry Forests, including stands within NSO Critical Habitat, which identifies the portions of the landscape that will be treated to provide greater resilience and the portions that will be left in a denser condition. As a starting point we recommend that approximately 1/3 of the forest might be left in this denser condition.**

It is difficult to identify a static land base for sustained yield management in this dynamic system, as it will shift over time. We recommend that the unique properties of Dry Forests drive the management strategy for them utilizing the principles we describe above and that a landscape plan be developed that implements these principles. Even that landscape plan, it is possible to make an first estimate of both short-run harvest and long-term yields.

Summary

To increase timber harvest on the O&C lands while maintaining environmental values, we recommend:

1) **Application of Ecological Forestry across O&C lands to provide both ecological**

benefits and economic benefits;

2) **Recognition of Moist Forests and Dry Forests with their own unique Ecological Forestry strategies;**
3) **On Moist Forests:**
    a) **Continue a thinning program that emphasizes variable retention thinning in younger stands;**
    b) **Reinitiate regeneration harvest in younger forests in Matrix using a variable retention approach followed by nurturing early successional ecosystems;**
    c) **Reclassify younger forests in Riparian Reserves and Late Successsional Reserves to sustained yield management through a cooperative effort of BLM, USFWS and NOAA Fisheries;**
    d) **Shift from a Survey and Manage Strategy to a Sensitive Species Strategy;**
    e) **Undertake a major cooperative effort by BLM and USFWS to identify the pattern and magnitude of Ecological Forestry within Northern Spotted Owl Critical Habitat;**
    f) **Also apply these recommendations to the O&C Controverted Lands in the Cascades managed by the Forest Service.**

    In total, these changes could double or triple the Moist Forest land base for sustained yield management.
4) **On Dry Forests:**
    a) **Apply a partial cutting strategy across all age classes in both Matrix and Late Successional Reserves, and inside and outside NSO Critical Habitat, to reduce threats and increase sustainability**
    b) **Reclassify some forest in Riparian Reserves to the upland restoration strategy**
    c) **Develop a landscape plan for the O&C Dry Forests identifying the portions of the landscape that will be treated and the portions that will be left in a denser condition through a collaborative effort by the BLM, FS, USFWS, and NOAA Fisheries.**

    We would expect that half to two-thirds of the O&C Dry Forests will need treatment through commercial and non-commercial activities.

Estimating Likely Sustained Yield Harvest Levels

The changes suggested here should enable a higher harvest level on the O&C lands both in the short-run and in the long-run. Estimating the likely harvest level from these changes with detailed accuracy, though, takes thought and analysis. It is important that land management agencies and regulatory agencies be involved in such an analysis.

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